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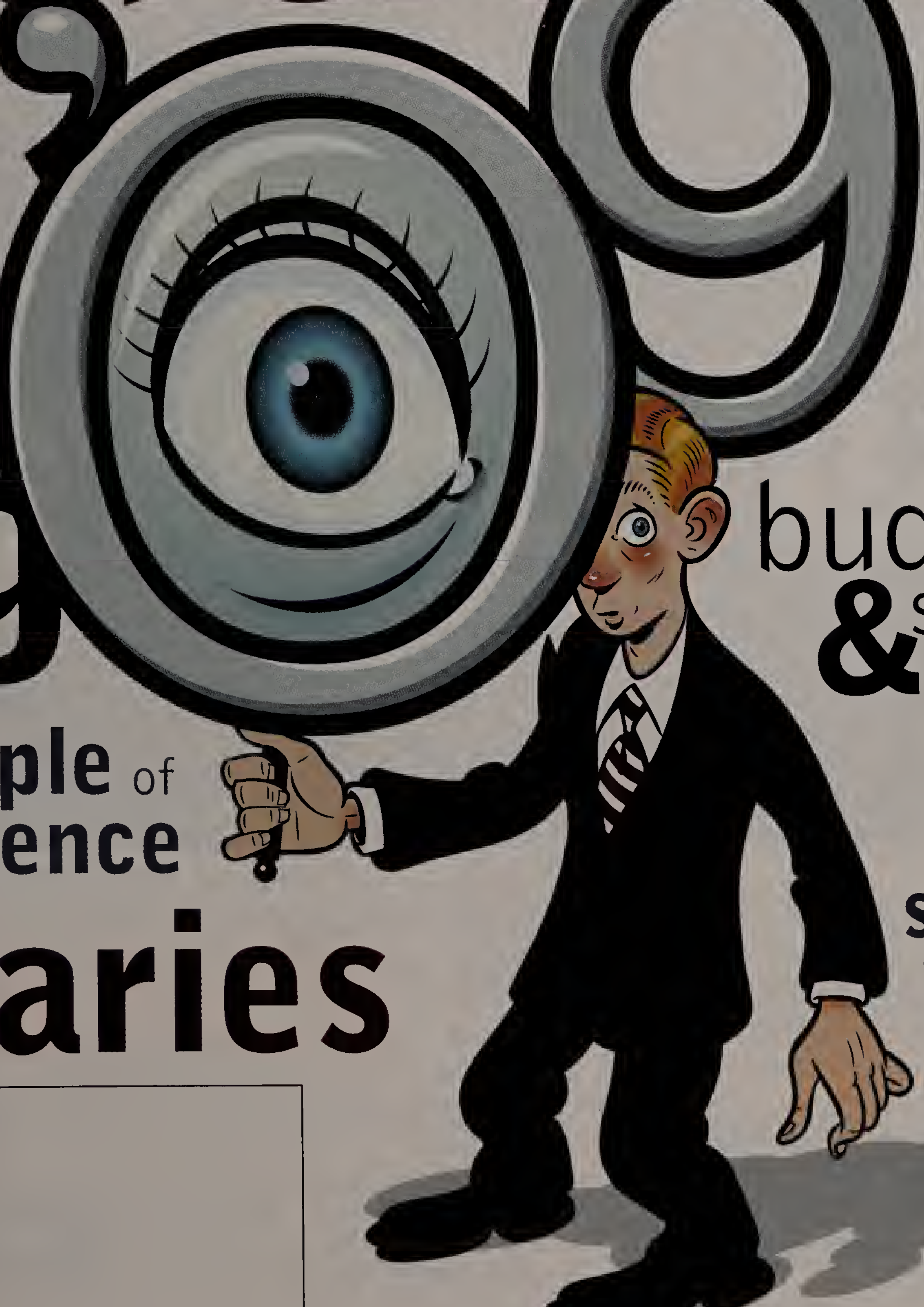

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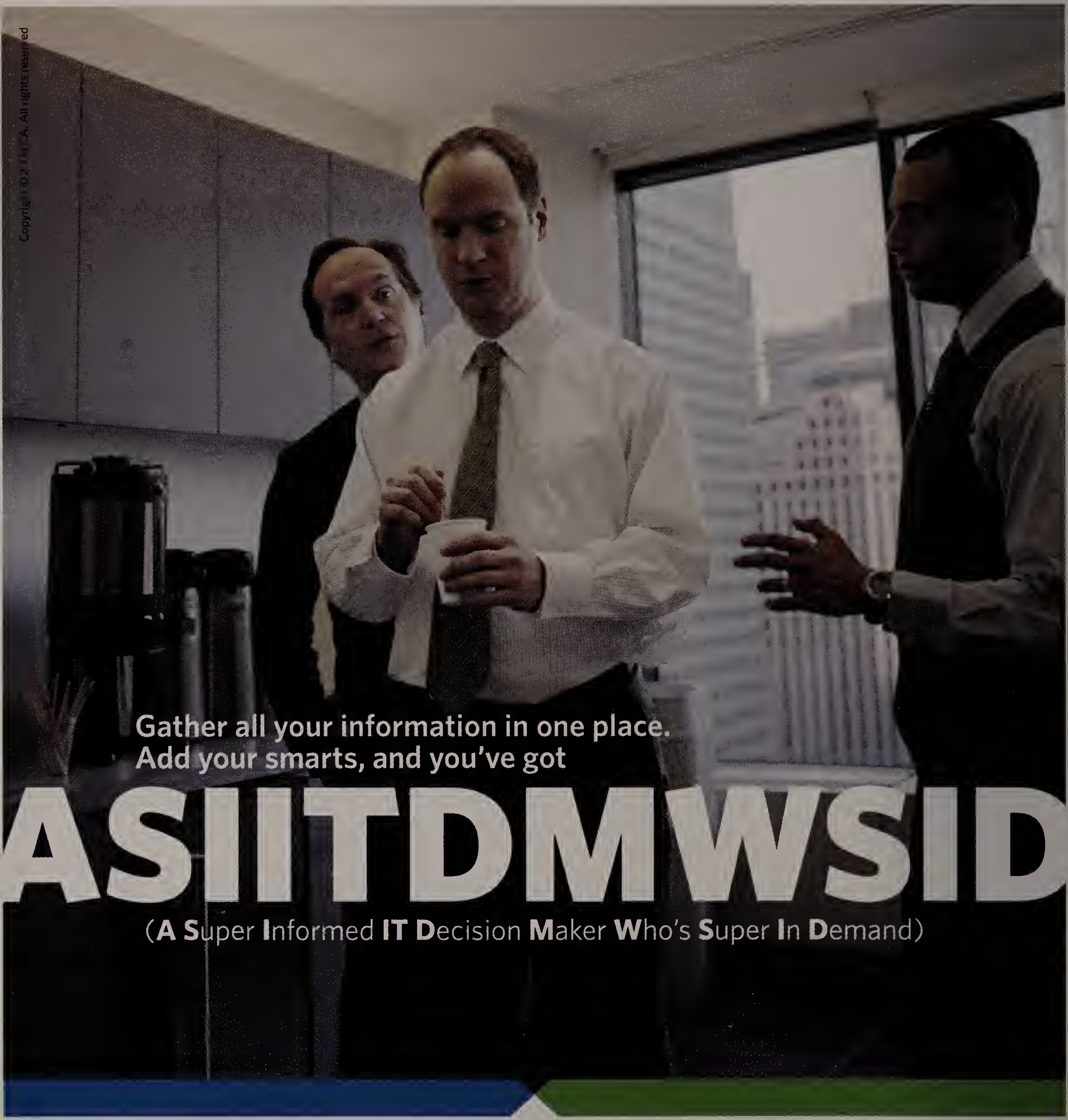
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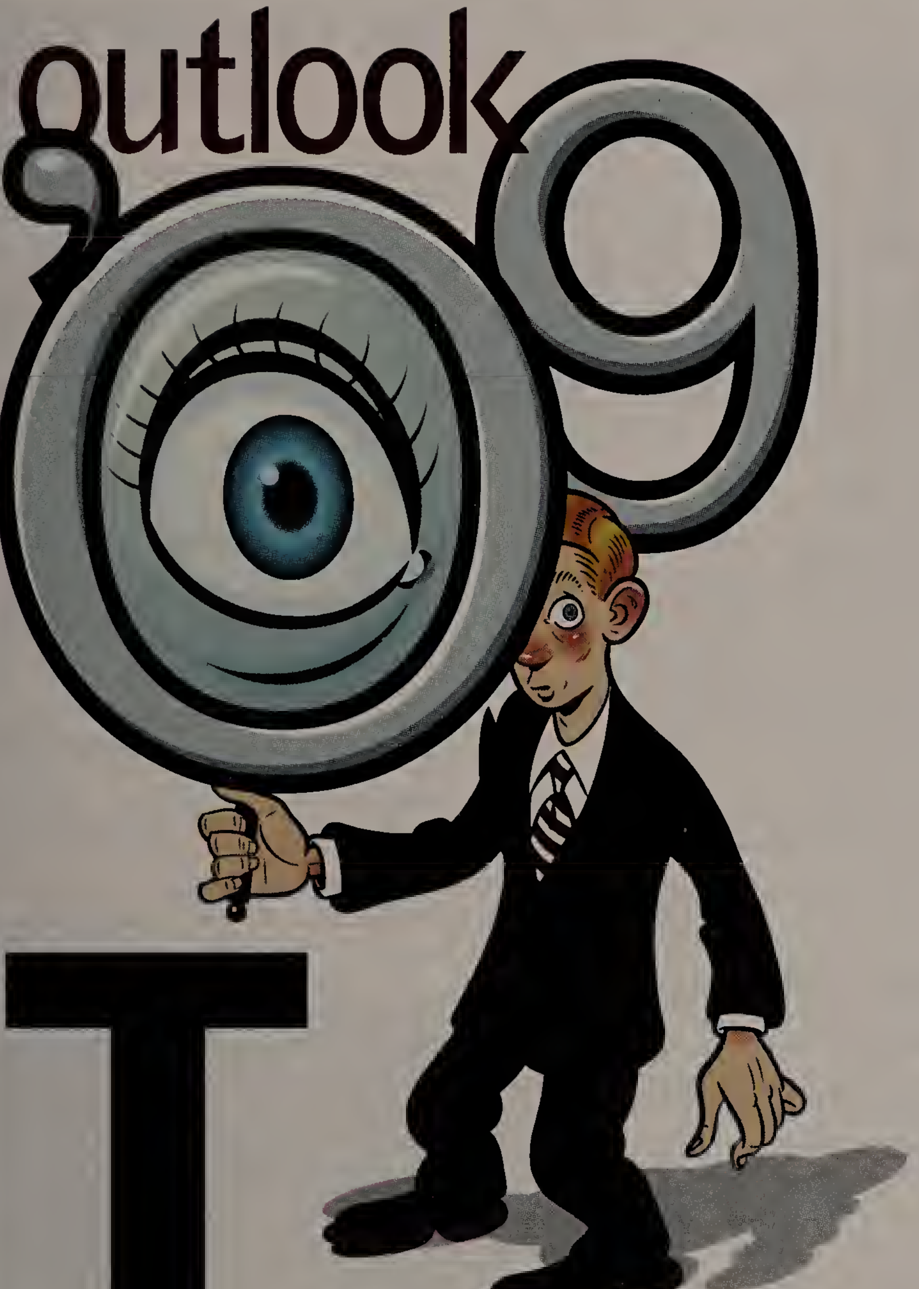
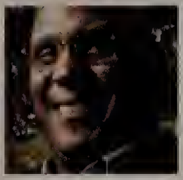


IT MAGNIFIED

Let's kick aside 2008 with a big "good riddance!" Contending with the economy's gyrations plus IT suppliers' contractions hasn't been easy. But you're ready to power up, and we're here to help. Inside you'll find in-depth analysis of the latest enterprise strategies, plus a look at hot technologies, start-ups to watch, people to know, and the money situation.



8 Enterprise IT: Ready for a bumpy ride

To meet company needs without major investments, IT execs are riding herd on business strategists and trotting out innovative technology approaches. **ONLINE:** Listen in as experts predict what's ahead for '09 in this special *Network World* Panorama podcast series. www.nwdocfinder.com/8139

13 Nine hot technologies for '09

Our annual list of hot technologies includes a few that exploded on the scene recently, plus some that have been simmering for years and just now are coming into their own.

18 10 people you should know

These power-brokers' decisions could shape IT in the enterprise for years to come. **ONLINE:** Flip through a slide show of highlights. www.nwdocfinder.com/8128

22 10 start-ups to watch in '09

Ten companies that offer interesting twists on everything from managing application performance across a virtual infrastructure to adopting public Web 2.0 technologies for use in the enterprise. **ONLINE:** See a slide show of product highlights from these companies. www.nwdocfinder.com/8121

- Participate in a poll about which start-ups have the most promise. www.nwdocfinder.com/8141

26 Spending down, contingencies at the ready

Roughly a third of readers surveyed said they will keep IT spending at 2008 levels, while another 43% said they will spend less, our first annual budget survey finds. **ONLINE:** Get all budget survey results in slide-show format. www.nwdocfinder.com/8129

- Listen in as Michael Gale, Strategic Oxygen CEO, names IT's top five spending priorities for '09. www.nwdocfinder.com/8142

30 Annual raises fall short, leaving IT pros to grin and bear

Even as IT executives strove to meet annual cost-of-living increases, they knew many professionals would be dissatisfied with overall compensation, our annual salary survey shows. **ONLINE:** Get a personal estimate of how much you should be making, with our interactive salary calculator. www.nwdocfinder.com/8133

- Get a regional view of salaries, job ratings and hot skills, with our interactive map. www.nwdocfinder.com/8136
- Skim through salary survey data on pay, satisfaction, loyalty and hiring for 2009. www.nwdocfinder.com/8138
- Listen in as Beyond.com CEO Rich Milgram gives his take on the 2009 IT job market. www.nwdocfinder.com/8140

35 Tech tonic for '09

The Obama administration can use strong IT policies as an elixir for the nation's biggest troubles. **ONLINE:** Which tech policies should garner presidential attention this year? Join a poll. www.nwdocfinder.com/8132

PLUS

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6 Networkworld.com: Catch up on the latest online stories, blogs, newsletters and video.

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COVER ILLUSTRATION: MARK MATCHO

PEERSAY

Beam him up

Re: The role of beam-forming in 11n (www.nwdocfinder.com/8146):

The thing about beam-forming — it's incredibly complex. I was involved in a radar system that used the technology with great success in the 1980s, although in theory this should be be simpler with just two transmitters. As someone alluded to, it would be trivial to get it wrong instead of right, and end up with a null spot instead of a strong spot where the client is situated.

> "It's nice that autoworkers weren't just dropped like hot potatoes, but what good did it do in the end? The companies are not better off for having the jobs bank."

Compound that with moving clients, and/or with multiple clients — well, you should appreciate the complexity. I want to see it for myself, and also independently tested, before I believe. Yes, I'm a skeptic.

With multiple clients, you can still get a positive effect with transmitted energy if you know the location of all the clients. So, the clients should see a stronger signal from the access point. But what about the traffic received from the client? In order for the same positive effects, the access point will need to be doing the same signal processing in the receive path. Problem is, the access point doesn't know when the client is going to transmit, does it?

I guess you can buffer all the received energy from each radio to make the calculations, but that's really complex. So, in summary, beam-forming has huge potential — but it also could turn out to be nothing more than marketing hype. We shall see.

Either way, I give props to all those math majors who made this stuff possible. Those are some unbelievably smart people! The performance of MIMO really blows me away when you have 802.11n clients and access points.

Steve Lilley

Discuss at www.nwdocfinder.com/8147

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Layoffs no joking matter

Re: How about a UAW-style 'jobs bank' for IT workers? (www.nwdocfinder.com/8148):

Soon after 9/11, I along with about 14,999 others lost their jobs at IBM. Within six months IBM fired another 15,000 people. In the intervening years, IBM is said to have employed 60,000 people in India.

This is why I found Ms. Musthaler's piece much less than funny. When someone bearing an H-1B visa shows up to be trained by her so that they can replace her, I wonder if she will have second thoughts about being "cute" in print.

Please find some germane topics for her to write about, or my statement above may turn into a prediction.

Antonio San Marco

Linda Musthaler responds:

Thanks for expressing your opinion, Antonio. My objective in writing the article was not to slam the people who lost their jobs; it was to criticize the companies (that are now failing) that paid their laid-off employees to do nothing. These people sat in union halls and played cards and watched TV. Why were they not given training for new jobs instead? Why were they not told to take college courses to earn a new degree? As long as they were ready to spend more than a billion dollars, why not put it to better use?

It's nice that autoworkers weren't just dropped like hot potatoes, but what good did it do in the end? The companies are not better off for having the jobs bank. The people aren't better off for it. The communities aren't better off for it. All it did was stall the inevitable. If the UAW had taken that billion dollars and retrained the workers for another career, the blow might be little softer today.

Discuss at www.nwdocfinder.com/8149

Web caches and net neutrality

Re: Google as evil, now from *The Wall Street Journal* (www.nwdocfinder.com/8150):

Web cache can be neutral if the cache algorithm is based on frequency of use, that is, it "transparently mirrors content." So, the question is: Will Google cache only Google content (non-net-neutral) or will it open the cache delivery equally to all Web traffic (net neutral)?

Manuel Vexler
IMS/NGN Forum

Discuss at www.nwdocfinder.com/8151

E-mail letters to jdix@nww.com or send them to John Dix, editor in chief, Network World, 492 Old Connecticut Path, Framingham, MA 01701-9002. Please include phone number and address for verification.

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DNS CHANGE MAKERS

PAUL'S DOMAIN.

I designed the foundations of DNS 25 years ago to be simple and modular. That's how dozens of extensions have been successfully added over the years to, for example, integrate DNS with DHCP, route VOIP calls, lookup RFID tags, and use international character sets. All aspects of the DNS are larger now. The email that needed one DNS lookup in 1983 now needs dozens for delivery and spam checking — not to mention a billion or so new public and private domain names. But don't let this seeming complexity get you down.

The first key for dealing with this challenge is to select tools that have been tested, proven and use the same simple and modular approach. That way, effort in one application helps another. At Nominum, we tested our ENUM servers to be sure that they could handle DNS databases that had millions of separate zones and billions of resource records and still deliver instant server restarts and still deliver industry-leading performance. That meant that when a huge antispam database application came our way we knew there was no scaling issue.

The second key is to use the advanced technology to monitor and control your DNS (and DHCP) systems. You shouldn't expect your sysadmins to validate security credentials by hand or learn new languages when your business goes international. Human error is always a concern. DNSStuff uses its own dedicated network assets to monitor your DNS systems at a level of detail unmatched by other tools, then it uses its proprietary algorithms to give you the most specific results and actions to fix any problems. When new DNS applications and extensions are added, DNSStuff tools are there. Not all DNS tools are created equal.

Paul Mockapetris, Father of DNS, invented 1983

DNSstuff.com

WHEN GOOD **ISN'T** GOOD ENOUGH.

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Follow these links to more resources online

BLOGOSPHERE

Windows Server 2008: finally friendly for drivers. Glenn Weadock writes in his Windows Server 2008 blog, "Both Vista and Server 2008 have earned a reputation for high uptime once the device driver situation is (as they say in England) 'well sorted.' In my experience, the few blue screens of death that I have seen, outside the Virtual PC/Virtual Server environment, have occurred on systems where one or more drivers are either (a) buggy or (b) not updated for the operating system. 'Windows 1' looks like a fix." www.nwdocfinder.com/8160

Top 10 technology gaffes of 2008. John Brandon writes in his Enterprise Google blog, "With the new year rolling in, a few companies will be happy to forget some of their worst moments of 2008. Since this is a Google blog, we have to include Google in this list. But any tech company is fair game. The No. 1 entry on our list is Google Mail Goggles. The idea is sound – giving you an opportunity to reclaim an outgoing e-mail before you embarrass yourself. We've all done it. The name 'Mail Goggles' is a play on 'beer goggles,' but it just makes Google seem goofy, not clever or funny. Read on to find out the missteps from BlackBerry, Yahoo and others in the year."
www.nwdocfinder.com/8161

Why the fuss about FriendFeed? Paul McNamara writes in his Buzzblog blog, "As someone who has just recently dipped a toe into Twitter, the prospect of diving into yet another social-networking community holds little appeal. However, others continue to boldly go wherever the cool kids take them, and lately that has meant FriendFeed. Robert Scoble explains why in a video posted to his blog: 'I'm aiming this at people who are just starting out on FriendFeed and trying to figure out how to make use of it,' he says. That he does in this nifty primer. What he fails to do, however, is convince me to take the plunge – at least not yet."
www.nwdocfinder.com/8162

Talking without speaking: Bell Labs' Silent Speech. Craig Mathias writes in his Nearpoints blog, "It's amazing the stuff you run across when you have time to just surf the Web, or at least catch up on your e-mail over a holiday. My friend and colleague Ray Horak sent me a link to an article that ultimately led me to a posting on Bell Labs' site. What the researchers there have done is to build a prototype system that could allow a cell-phone user to 'speak' via mouthing the desired words and be understood at the other end – but without making a sound."
www.nwdocfinder.com/8163

INTERVIEWS, THE COOLEST TOOLS AND MORE IT VIDEO

IDG NEWS WIRE

Consumer tech 2009 preview

Discover the trends we can look forward to in 2009 in the world of consumer electronics.

www.nwdocfinder.com/8143

IDG NEWS WIRE

2008 gadgets in review

Surprisingly, it wasn't just about the iPhone 3G. Take a look at some other gadgets we loved in 2008.

www.nwdocfinder.com/8144

NWW PANORAMA

2009 IT prediction podcasts

Our experts offer up IT predictions in the worlds of security, social networking, IT spending and the hottest job skills for the upcoming year. A series of podcasts is available for downloading to get you ready for 2009.

www.nwdocfinder.com/8145

BEST OF NWW'S NEWSLETTERS

Cisco takes on servers

Network architecture: It's hard to ignore the recent revelation that Cisco is working on a blade server of its very own, a development that seems to go to the very heart of what "network architecture" is.
Network World's Jim Duffy last week wrote that Cisco is expected to introduce blade servers next year, which would compete head-on with those from IBM and HP.
If I remember right, Cisco doesn't like to compete in a market unless it thinks it can reach No. 1 or No. 2 in that market. Does Cisco really believe it can knock down those industry giants — and, as Duffy points out, partners — on what is essentially their home turf? **www.nwdocfinder.com/8152**

Network/systems management:
Among the few technology areas that can actually thrive in tough economic times are management and automation technology. Vendors promising to reduce manual labor, cuts operational costs and improve services to the business could win IT budget dollars even in the midst of a recession. Managing mobile devices can challenge IT staff, depending on which devices the group supports, but these vendors hope to get in front of the issue with new applications that enable advanced monitoring and control of the moving targets. For instance, Kace Networks this week announced the availability of KBOX iPhone Management Module, an appliance-based systems management product for Apple's popular smartphone. The company says iPhone's popularity among small-to-midsize businesses — a sweet spot for Kace — further drove executives to make iPhone management features available. According to Kace, 22% of IT managers reported purchasing an iPhone for business use. Forrester Research has reported that 10% of SMBs will adopt iPhones in 2009.
www.nwdocfinder.com/8153

Convergence & VoIP: Making predictions for 2009 is a little tougher than usual given today's economic challenges and uncertainty, but we're willing to give it a shot — provided our readers are willing to understand our perspectives come with less optimism than we normally project. Given the disclaimer, here are our Top 10 predictions for VoIP and convergence in 2009: (1) Infrastructure suppliers will be highly focused on execution and less attentive to innovation in 2009, striving for operational excellence critical in tough times. We expect to see more focus on delivering what has already been promised than on promising what might be delivered. For the rest, go here:
www.nwdocfinder.com/8154

Juniper poaching Nortel's channels?

Juniper Networks has the most to gain from Nortel's tenuous financial position, according to a bulletin issued by investment firm Oppenheimer & Co. Juniper is recruiting Nortel's channel partners aggressively as that company grapples with the decision about whether to file for bankruptcy as it readies some of its assets for sale. Nortel reportedly has received bids for its Metro Ethernet Networks business, which the company put on the block in September, and may be looking to sell off other businesses. "We believe recent reports that Nortel is contemplating bankruptcy are likely to force its enterprise channel to look for new alternatives," states Oppenheimer analyst Ittai Kidron in the report. "With $600M to $700M in quarterly enterprise revenue, we believe Nortel's enterprise business could deteriorate faster than its carrier business. We expect competitors to aggressively poach Nortel's channels and enterprise business." Oppenheimer believes Juniper already has taken "aggressive steps" targeting Nortel's channels and is the one competitor — Cisco and F5 Networks are others — that could see the most meaningful upside relative to its market position. **www.nwdocfinder.com/8155**

More IT budget, staff cuts expected first half of 2009. An increasing number of IT workers expect to see budgets and staff cuts during the first half of 2009 as earlier plans for growth dissolve. Survey results released by CDW show that 19% of corporate IT decision-makers are anticipating budget cuts in the first half of 2009, an increase of eight percentage points since October. In addition, 11% of respondents expect staffing decreases in the next six months, compared to the 5% who reported in October they expect decreases. On the positive side, 84% of large and 77% of midsize businesses plan to purchase new hardware in 2009, and 87% of large and 78% of midsize businesses intend to invest in software. Data reported in this release of the CDW IT Monitor is based on a survey of 1,059 IT decision makers conducted between Nov. 10 and 17, 2008. **www.nwdocfinder.com/8157**

LG to debut 3G watch-phone at CES. LG Electronics plans to debut a wristwatch-style 3G phone at the Consumer Electronics Show this week. The LG-GD910 phone will go on sale first in Europe; it builds on a prototype shown at CES 2008. In the center of the watch face is a 1.4-inch touchscreen display that is used for most interactions. For example, it is used as the keypad for making a call. There also are buttons down the side of the phone's body, and a small camera above the top right corner of the screen enables video calls. The WCDMA phone supports the latest 7.2Mbps HSDPA data system, so downloads should be fast. Other features include Bluetooth, an MP3 player, a speakerphone and a text-to-speech function. The handset also is waterproof. LG has yet to disclose the timing for the launch. **www.nwdocfinder.com/8156**

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OVERVIEW: Network Instruments® is the industry-leading developer of distributed and affordable network management, analysis and troubleshooting solutions. The award-winning Observer® family of products provides integrated monitoring and management for the entire network.

CHALLENGE: Central DuPage Hospital, the second busiest surgical center in Illinois, recently implemented several major initiatives including a significant VoIP deployment, telemetry patient monitoring system, and a Computerized Physician Order Entry (CPOE) system.

Central DuPage lacked adequate tools to manage network, application, and connectivity issues associated with a recent VoIP implementation and expansion of critical network applications.

SOLUTION: Central DuPage used Observer® Expert to conduct network assessments and benchmark performance before implementing VoIP. Observer remains crucial in monitoring VoIP phones and wireless communications between doctors, nurses, hospital staff, and patients.

"We didn't have adequate analysis tools to manage network, application, or connectivity issues," said Jack King, director of IT. "We were in the middle of a significant VoIP deployment and had plans for implementing other critical applications. We needed an analyzer to monitor and maintain performance."

They used Observer Expert to conduct network assessments, ensuring a successful VoIP deployment.

"Network Instruments provides us complete visibility into everything on our network," said King. "Visibility is critical for us being able to quickly identify and troubleshoot issues before they impact performance. Locating problem causes without Observer Expert would be like trying to find a needle in a haystack in the dark."

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Enterprise IT: Ready for a bumpy ride

To meet company needs without spending big bucks, IT execs are riding herd on business strategists and trotting out innovative technology approaches

BY DENISE DUBIE

"If [a project] isn't going to provide us with efficiencies to do our work better or reduce overhead while improving services, it won't make the cut."

— DEVON CHALMERS, CSO, PBS&J

Enterprise IT executives are taking the economy's downturn in stride. This not being their first time at the rodeo, they know how to take the bull by the horns.

High-tech leaders looking out over the year anticipate tightened budgets, greater demands on limited staff and tough negotiations with business managers about which needs technology can meet during this financial crisis. What they don't anticipate is a repeat of their experiences during the industry collapse of 2001, when IT executives took backseats while CEOs decided the direction of their corporations' technology use.

"The last time IT experienced this type of economy, the budget cuts were more punitive in light of high-tech seeing double-digit growth for years," says Robert Whiteley, a principal analyst at Forrester Research. "IT basically gutted itself and, from a skills and alignment perspective, has been paying for it ever since. Now IT is going to be smart in the cuts and offload noncore functions, while maintaining necessary resources."

That's why many IT executives view today's economic uncertainty more as an opportunity to stretch their muscle, and less as an uncontrollable force. Some say they even feel empowered to guide business leaders via strategic technology decisions that improve the bottom line.

Many IT leaders, for example, are investing in software-as-a-service (SaaS) — which involves providers delivering applications via a hosted, subscription-based model — to bring killer applications in-house without breaking the bank. They're changing service levels to require less immediate help desk responses for calls that aren't business-critical. And some are rolling the dice and cutting back investments in disaster recovery to facilitate

Enterprise IT, see page 10

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Enterprise IT, continued from page 8

increased mobility for workers.

The point is, IT executives can lead the charge to optimize services with less money.

"One should never turn down the opportunity to exploit a crisis, and IT organizations are more willing today to take a risk to get a benefit," says Peter Whatnell, CIO at Sunoco and president-elect for the Society for Information Management.

Where's the budget?

IT budgets indeed have shrunk for 2009: In a survey of *Network World* readers, roughly one-third of 123 respondents said they intend to keep IT spending at 2008 levels, and another 43% said they will spend less (see "Spending down, contingencies at the ready," page 26). IT organizations face a lean, challenging year of providing more services with fewer resources.

With shriveling IT budgets, spending forecasts for 2009 have fallen, too.

Gartner has dropped its worldwide IT spending estimate for 2009 from 5.8% to 2.3%. Forrester has adjusted its U.S. technology-spending predictions for the year from 6.1% to as low as 2%. And IDC has ratcheted down its global IT-spending growth projection of 5.9% to 2.6%. U.S. spending won't grow as much as 1%, IDC predicts.

Today's IT executives, however, are financially smarter and savvier about business than they were eight years ago. They still haven't reached the nirvana of complete business-IT alignment, but this year will provide IT executives with the chance to showcase just how far they've come.

Ken Harris, CIO at Shaklee, a maker of natural nutrition, cleaning and personal-care products in Pleasanton, Calif., sees the situation this way: "IT has become a standard part of the business. It is embedded into many aspects of the company, and can't easily be extracted at this point."

IT can't be left out of big-picture budget discussions either.

"It's less of a situation now where someone from the business dictates to the CIO about cutting budgets 20%, and more about how IT as an organization finds ways to advance the infrastructure and add value — even as budgets are being tightened," Harris says.

Susan Cramm, president of IT leadership consultancy Valuedance, agrees.

"IT has positioned itself as being much more cost-conscious, and the business doesn't look to IT as though it's completely out of control, buying technology for technology's sake," Cramm says. Previously CEOs just might have cut the budgets; now they are telling CIOs the numbers they need to reach and trusting them to figure out the best ways to get there. That's a good thing."

"In this economy, we will consider riskier options [such as software-as-a-service] simply because they make sense financially."

— JEREMY GILL,
CIO, Michael Baker Corp.

IT has more options at its disposal than ever before to weather an economic storm. For instance, SaaS and cloud computing offer IT organizations variable pricing models and much-needed technologies at a lower cost and faster time to market. Virtualization continues to let IT consolidate physical resources, which lowers power, cooling and other costs and increases services to the business. With far fewer dollars to spend on new investments, IT organizations will have to be creative this year to succeed.

At Shaklee, signing on for Virtela Communications' managed network services has let IT add value without burdening the budget. The company needed to expand quickly from five countries to 50 and distribute its products globally.

"Budgetwise we were not going to be able to bring professionals with the right skills on board, and we needed to achieve the business goal of going global," Harris explains. "By choosing managed services, we got there without having to make significant investments in technology."

Strategic spending

IT organizations this year will be examining which technology investments serve the business best and which might be better left on the back burner.

"With every project we approach, we now consider closely how it helps us build efficiencies within the organization. And if it isn't going to provide us with efficiencies to do our work better or reduce overhead while improving services, it won't make the cut," says Devon Chalmers, CSO at PBS&J, an architecture, construction and engineering firm in Atlanta.

A wireless overhaul passed the efficiency litmus test —the firm has 90 offices nationwide with a very mobile workforce — and so it has the spending go-ahead for the coming months, Chalmers says. By implementing a next-generation, 802.11n system from Aerohive Networks, he will be able to provide more centralized control, security and efficiencies in PBS&J's wireless environment.

"We bring up offices all the time. Our engineers, architects and construction staff need to be mobile so they are not stuck without access to their work," Chalmers explains. "To support our users, we need to create a centrally managed, autonomous environment."

The opposite is true for Michael Morris, communications engineering manager at a $3 billion high-tech company and a *Network World* blogger (www.nwdocfinder.com/8131). His company deferred plans for a wireless infrastructure upgrade and a WAN-optimization rollout to focus on IT projects that will save the company money.

"It's getting harder to justify infrastructure activities that potentially could enhance productivity for the entire organization but are difficult to tie back to a specific business unit," Morris says.

Vetting various cost options

Being able to vary IT expenses is especially critical in a down economy. This year, more than ever, IT executives will be weighing whether to buy technologies outright or pay for needed capabilities via subscriptions.

More enterprises will put together their core packages of enterprise services using internal and external virtual or cloud resources," says Phil Hochmuth, a senior analyst with Yankee Group. "The virtualization concepts that are reshaping enterprises — decoupling applications, operating systems and services from physical hardware and locations — will extend beyond the enterprise perimeter."

SaaS already has taken off, and industry watchers expect this trend to continue. Gartner expects the technology's worldwide spending uptick — which at the close of 2008 stood at more than $6.4 billion, or a 27% increase from 2007 — to continue this year and beyond. The research firm forecasts the market to more than double by 2012 to $14.8 billion.

In addition, cloud-computing technology is expected to see rapid adoption in light of the current economic condition (see "Nine hot technologies for '09," page 13).

By 2012, IDC predicts, dollars spent on cloud-computing services will account for 25% of the growth in IT spending worldwide and almost one-third of 2013's growth. The research firm also expects that by 2012, nearly 10% of IT spending will be on cloud offerings, including SaaS and cloud storage. IDC also forecasts that spending on IT cloud services will reach $42 billion by 2012.

"Just as virtual servers are easily brought online, moved around and deprovisioned in an enterprise cloud, businesses will look to bring in pieces from externally hosted sources, whether those are SaaS business applications — such as Salesforce.com, storage, backup and disaster recovery — or security services, such as filtering and inspection technologies," Hochmuth says.

Cloud storage, along with grid computing, is a top priority this year for Alex Godelman, vice president for technology at Gorilla Nation, an online-advertising sales representative firm in Los Angeles. The promised efficiencies of such technologies bring business and IT leaders together, and that eases planning during an economic downturn. Cloud storage software, such as from ParaScale, would prevent vendor lock-in and lessen the investment he would have to make in a high-priced storage infrastructure, he says.

"If you look at a traditional mass-storage environment, you invest in a [storage-area network] framework and can

Enterprise IT, see page 12

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Enterprise IT, continued from page 10

grow it to a certain extent, but beyond that level, you would need to do a forklift upgrade," Godelman says. "With cloud storage, when you need more capacity, you add another component to the cluster of low-cost components. You repurpose existing hardware investments and make a very insignificant software investment."

Cloud computing remains an emerging technology, and many in IT aren't comfortable with storing company data in an external location; the lower cost and proposed efficiencies, however, will override those concerns this year.

"We will be focusing on our core applications and looking to see what makes sense to outsource so we can cut administrative costs. SaaS can cut costs, but it introduces a risk in putting company data elsewhere. But in this economy, we will consider riskier options [such as software-as-a-service] simply because they make sense financially," says Jeremy Gill, CIO of Michael Baker Corp., a civil engineering firm in the Pittsburgh area.

Optimizing existing networks

This year also will see IT executives carrying on the 2008 trend of reworking existing systems and networks for optimal performance. This they'll do in lieu of buying the latest and greatest hardware.

Blogger Morris' company has completed all the research around a syslog project that involves dedicating network staff to engineering and architecture work that could boost performance, he says. "It is all about cost savings. Projects are being slashed left and right, so we are turning toward internal projects that don't require us to spend money right now," he adds. The company also will look for ways to limit external conference calls and use internal resources that cost less.

"With external projects on hold, it frees up my team to improve processes and look for ways to introduce more automation in the environment," Morris says. "We may get a lot of projects cut, but we have a lot of work we can do, such as routing-protocol optimization, that doesn't require anything but labor and could drive revenue with improved business processes."

Others are sticking to planned projects, but negotiating with vendors to get better prices or extending the life of the project to lessen the blow to this year's budget.

For approved projects, "we are looking at pushing the timeframe out, trying to save some money in the budgeting cycle in 2009, but still trying to get what is important to the business done," Michael Baker's Gill says. For example, the company's IT department is kicking off Phase 1 of a collaboration project that involves moving e-mail, file and print servers from Novell to Microsoft, he says. It will be expanding integration points to include voice, video and presence technologies to drive work-sharing among offices and improve utilization rates. The first part of the project will lay the foundation; then IT will implement pieces that provide value in the long term.

"This project is ideal in a down economy because we can get it done within the budget constraints, but we are still adding some value by revisiting business processes and using technology to streamline," Gill says. The business still can take advantage of the project's incremental gains, while IT can slow capital projects to reduce the risks associated with having little wiggle room in their budgets.

"A big trend across enterprise IT in 2009 will be process efficiency: How can I make better decisions, act more efficiently and reduce the operational burden?" Forrester's Whiteley says. Those efforts will result in incremental spending in management and automation technologies, but only when IT can prove a demonstrable and quick return on investment. "It's a good time to work at getting everyone in IT singing from the same songbook," he says.

Process efficiencies, such as the best practices laid out in ITIL, Control Objectives for Information and related Technology (CoBIT) and other industry standards, offer IT an outline of approaches to specific tasks. Management-software vendors incorporate the guidelines implementing change-management policies, for instance, into their monitoring and reporting tools. Then, organizations standardizing a specific process can turn to automation products — also available from management software vendors BMC Software, CA, HP and IBM — to remove the tedious manual labor.

"Now is the time to take advantage of process-automation and workflow tools. They are reasonably mature, and they introduce efficiencies that ultimately save money," says Mary Johnston Turner, an IDC research director. "It is important that IT take these manual processes and codify them to free up staff wherever possible."

Virtual, green gain ground

Green IT will continue to be important this year, but improving business economics — not the world ecosystem — will be the motivator, industry watchers say.

"Green has the promise of a better world, but really it is about trying to be a lot more efficient when it comes to lowering the expense associated with infrastructure components," Gorilla Nation's Godelman says. "Any company with a large environment realizes the costs associated with it. Understanding the green element of each technology footprint will help cut costs significantly."

If going green means more green in company accounts, business leaders will hop on board with the IT initiative. "Green is going to be all about cost efficiencies, and virtualization is going to be across the board — servers, storage, applications, network — based on business demand for more services fast," says Tony Bishop, founder and CEO of IT consultancy Adaptivity. "You also will see data-center container technologies popping up. It is going to be radical."

A modular, containerized data center, available from such vendors as HP, IBM, Rackable Systems and Sun, fits storage and hundreds, sometimes thousands of servers into one large shipping container with its own cooling system. Proponents say that containerized data centers are easier to set up and manage than traditional data centers, and are more power-efficient.

"Leading firms need to get the cost out. They need to get to the point where they can shrink their infrastructures physically and do double the volume," Bishop says.

Ian Rousom, who works in infrastructure design engineering for Lockheed Martin Enterprise Business Services in Denver, sees this as the year of the reduced footprint across all technology elements. That means converging network and storage resources across the same infrastructure.

Theoretically, such technologies as Fibre Channel over Ethernet (FCoE) would help IT support one set of switching infrastructure devices instead of two. That offers simplicity in management but also provides cost advantages in terms of power, cooling and real estate, Rousom says.

"2008 was about how FCoE would emerge as a standard, and in 2009 we expect to see some products and a higher degree of interoperability," Rousom says. "It would require newer switches, but we could run the same Fibre Channel protocols we use for storage over the Ethernet network, and it would streamline the environment."

Rousom also is keeping an eye on virtual switching technologies emerging from Cisco and to a lesser degree, Juniper Networks. He says virtual switching products, such as Cisco's Nexus, would restore the network's responsibility in the switching infrastructure — server virtualization shifted some of that ownership to the systems group — and enable IT staff to use the same management processes and products for the physical and virtual environment.

"If virtual and physical switches were running the same software, you could use the same management tools and staff would apply the same expertise to run and operate the devices," Rousom says. "There would be less potential for incompatibility and conflict for the virtual and physical infrastructures interacting."

Virtualization, as well as multifunction network devices, will become mandatory for IT shops planning to reduce infrastructure, lessen costs and improve services to the business. WAN optimization, security and network-management services will be compiled into fewer devices, making the enterprise IT environment ever more fluid, yet more cost-efficient, analysts say.

"Expect to see networking and virtualization become more closely intertwined in '09; enterprise IT departments are starting to take the concepts from server and data-center virtualization and apply those to network-based services, such as security, QoS and network management," Yankee's Hochmuth says. "This ultimately will result in networks where such technologies as packet inspection, security, traffic shaping and acceleration will be decoupled from individual network products and deployed as enterprisewide virtual services. And this will be pervasive, from the LAN edge to the aggregation, core and data center, as well as across the WAN." ■

Nine hot technologies for '09

BY NEAL WEINBERG

Our annual list of hot technologies includes a few that exploded on the scene recently — cloud computing, Web 2.0 and green IT — plus some that have been simmering for years and just now are coming into their own — unified communications, network access control and 10 Gigabit Ethernet. Here's a rundown, plus a tip or two about how you might approach each one.

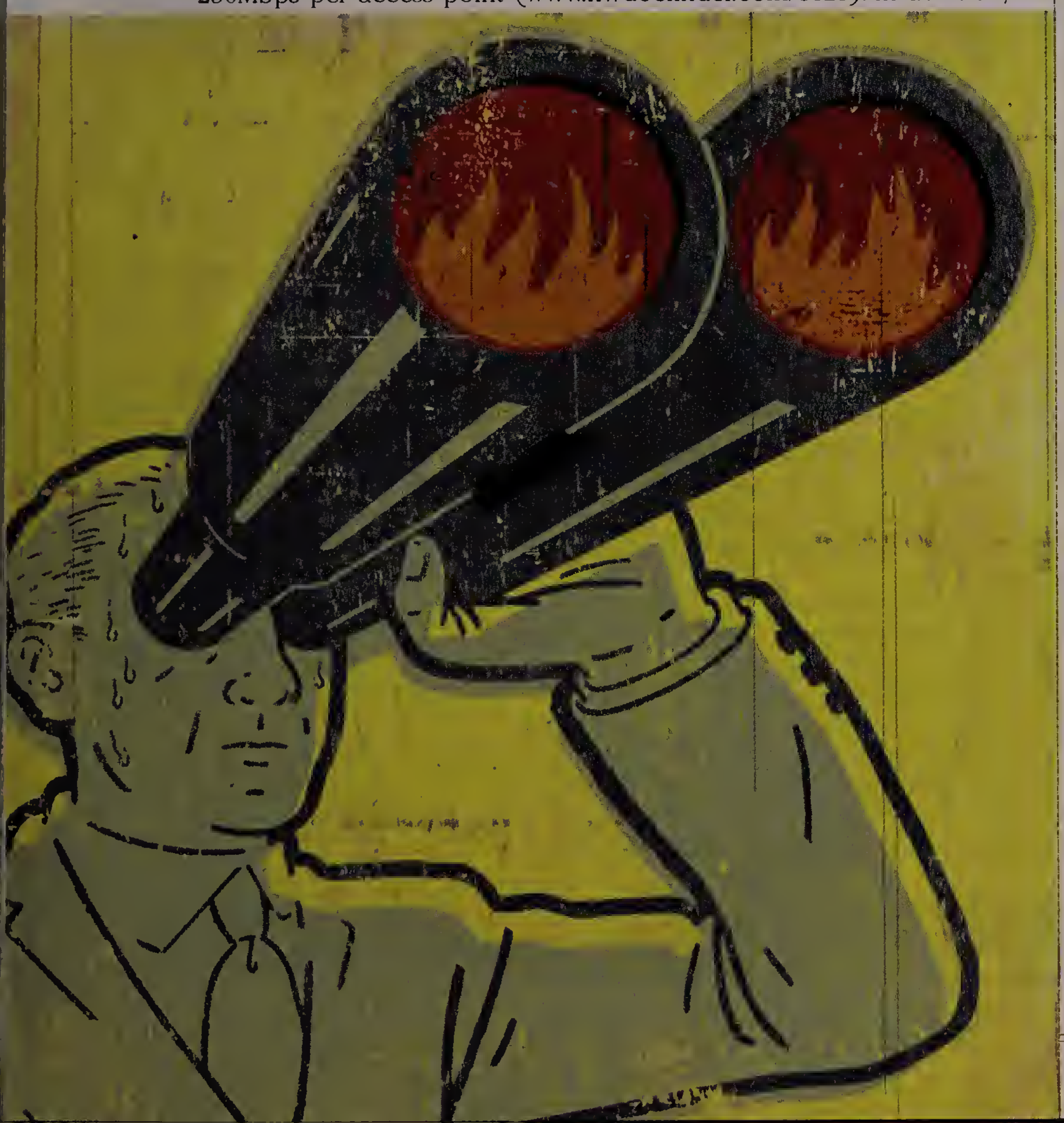
1. 802.11.n: The "n" stands for now

It's been a long time coming, but 802.11n is finally here. And that means wireless LANs now are a viable replacement for wired LANs.

Without delving too deeply into the past, we all remember the war-driving horror stories: buggy Wired Equivalent Privacy implementations, 802.11b technology that promised 10Mbps but barely delivered 5Mbps, 802.11g technology that promised 50Mbps but barely delivered 20Mbps, and prolonged standards battles over 802.11n.

Yes, Wi-Fi technology has been a tad disappointing. On the other hand, we have come to expect and appreciate wireless networks in our homes, coffee shops, airports and hotels. And employees, particularly younger ones, impatiently await the wireless workplace.

In *Network World's* groundbreaking test of 802.11n access points and controllers, 802.11n technology delivered impressive data rates of 250Mbps per access point (www.nwdocfinder.com/8125). In addition, it delivered solid performance numbers on latency and jitter, which means it can support such real-time applications as voice and video. The systems we tested had a variety of enterprise-level features, such as Power over Ethernet; dynamic radio-frequency control; QoS; and such security functions as intrusion prevention and detection, Wi-Fi Protected Access 2, and stateful firewalls.



DAN PAGE

When it comes to new construction, 802.11n should be the default choice. The choice gets tricky, however, when it comes to existing networks. If you already have some 802.11a/b/g/, keep in mind that running a mixed network will result in significantly reduced bandwidth. In our tests, mixed-mode throughput was 24% of the throughput in an all-802.11n network.

Nevertheless, no matter how you decide to roll it out, 802.11n is ready for the enterprise.

2. Unified communications: Getting warmer

Unified communications is one of those technologies that's seemingly forever been on the verge of exploding but has never really become hot.

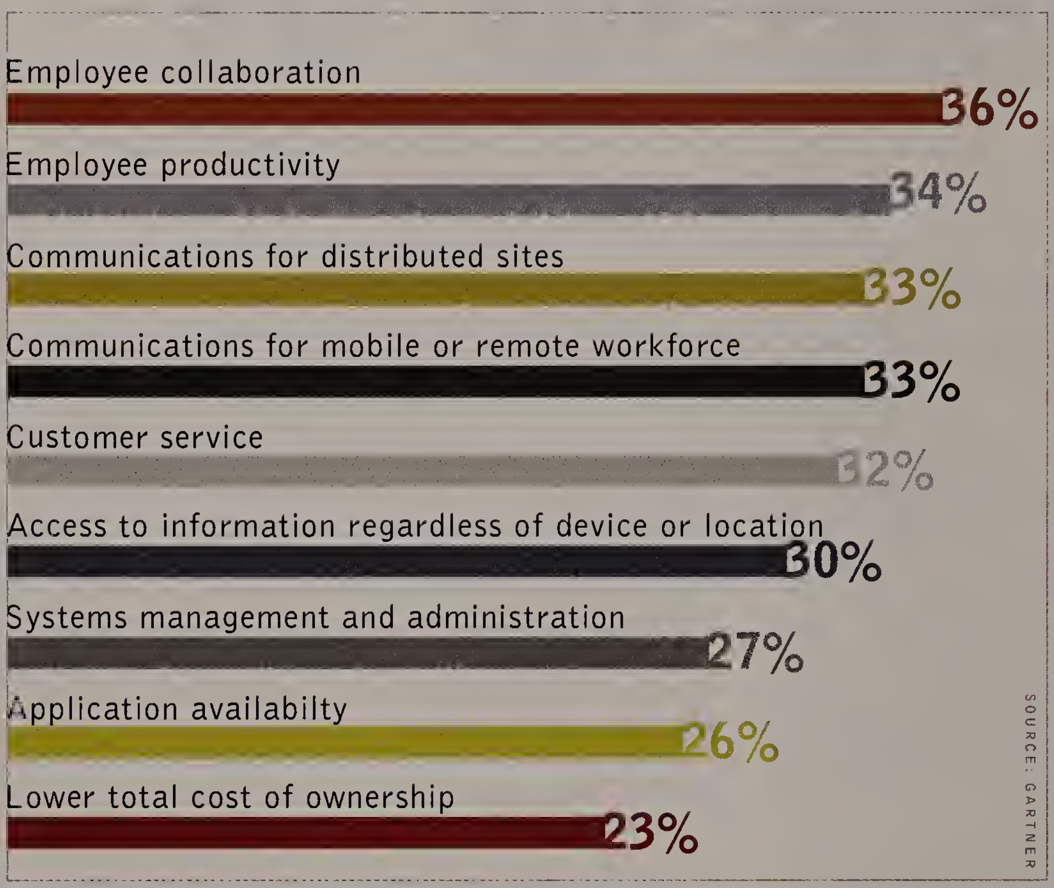
Maybe the reason is that the term "unified communications" means different things to different people. To the telecom manager, it means replacing the tried-and-true PBX with an IP-PBX from a traditional telephony hardware vendor or from an open source start-up — or maybe even jumping to a software-based platform from Microsoft.

To the desktop user, it means switching to an IP-based phone and taking advantage of a variety of such UC-based productivity applications as audio- and videoconferencing, instant messaging and presence, integrated voice and e-mail.

To BlackBerry-toting mobile workers, UC means being able to use the mobile devices to perform all the business functions associated with an office phone. They want calls made to their desktop phones to bounce to their mobile phones. They want to dial into the office and have their e-mails and voice mails read to them. They want all their devices to sync up seamlessly.

Why unified communications?

Gartner asked IT execs in North America and Western Europe to list the three areas of their organizations that were most improved after unified communications was deployed. Employee collaboration and productivity received the most nods.



SOURCE: GARTNER

The good news is that all these features are available today from vendors including Alcatel-Lucent, Avaya, Cisco, IBM, Microsoft, Nortel and Siemens.

UC technology isn't setting the world on fire, but it is spreading inexorably across enterprise networks. Nemertes Research recently found that just 16% of the 120 companies it surveyed are doing nothing with UC. More than one-third (36%) are in an initial planning phase; 28% have a limited deployment of specific applications that make up the technology, or a full deployment to a limited number of people; and 19% have developed their strategies and are implementing the technology companywide.

What are the drivers of UC? Years ago, the decision was all about saving money and about moves, adds and changes. Last April, when Gartner asked early adopters to list the three biggest benefits of deploying UC, the top answers were employee collaboration, employee productivity and communication for distributed sites. Lower total cost of ownership came in last.

3. Data protection: It's the data, stupid

In today's world of mobile workers, teleworkers, thumb drives, BlackBerries and social-networking sites, IT executives can't worry about devices — they need to focus on protecting data wherever it is.

The obvious place to start — considering that an estimated 5,000 laptops are stolen or lost each year — is the laptop hard drive: It needs encryption.

Software vendors and such open source projects as TrueCrypt offer whole disk encryption across all operating systems, and Microsoft offers disk encryption in Vista, so IT executives have no excuse for not encrypting laptop data. In addition, such hardware vendors as Fujitsu, Hitachi and Seagate Technology offer hardware-based disk encryption.

Another trouble spot is e-mail. A variety of e-mail encryption methods are available, but all of them run into the same problem — they require the recipient of the encrypted e-mail to go to a secure server and enter some form of identification before they can gain access to the decrypted e-mail. For most people, this is a nuisance that rises to the level of a deal-breaker.

Another way to approach e-mail security is through data-loss prevention. DLP tools scan outgoing e-mails for such information as Social Security numbers, sensitive keywords or other possible breaches. Then they flag the offending e-mail. Companies dictate how offending e-mails are handled: They can be returned to the sender, bounced to an IT manager or encrypted.

DLP products, however, can be difficult to get right. That's because companies have to hammer out policies for determining which types of data need watching, what happens when an e-mail is flagged, and whether the individual user should be required to decide whether to encrypt specific e-mails or types of e-mails. For example, the CIO might not appreciate it when he sends an e-mail to the CFO and it gets flagged, bounced back or held up.

Other potential problem areas — everything from thumb drives to smartphones — abound. Nevertheless, vendors today are offering encrypted USB drives and business phones with encryption features. IT executives need to make data security a requirement every step of the way.

4. Green IT: A new worldview

Can you afford to be green? Can you afford not to?

Those are the questions IT executives face as they grapple with the notion of environmentally friendly computing in the midst of a crushing global economic downturn.

For many companies, going green simply means cutting data-center power expenses. By now, the basic principles of doing that are pretty well understood — consolidate servers, set up hot and cold aisles, optimize airflow, raise the ambient temperature a few degrees.

Such changes can save money, but green IT doesn't stop at the data-center door, and companies can't just pass the buck to facilities managers. IT departments can and should undertake a number of green initiatives — which won't break the bank, either.

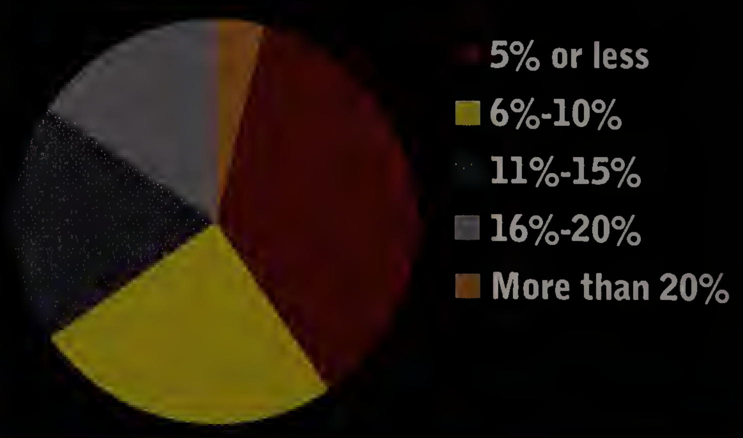
First, persuade your company to measure its carbon footprint. This seems like an obvious place to start, but you can't address the issue in a logical, analytical manner if you don't have a starting point.

Once you have a sense of that footprint's size, you can set goals for reducing it by an achievable amount — say, 5% or 10% over a certain period of time. There are a number of actions you can take, including these:

- Power down unused servers or desktops.
- Use energy efficiency as a purchasing criterion when you replace older equipment, including network gear, servers and UPS.

The IT budget and energy costs

Energy costs are eating up large chunks of IT budgets, according to a survey of *Network World* readers.



See 9 technologies, page 16

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9 technologies, continued from page 14

How are you going green?

Gartner recently asked IT execs to name the No. 1 action they were taking or plan to take as part of a "green IT" initiative. Here are the top seven answers:

1. CONSOLIDATE SERVERS USING VIRTUALIZATION.
2. ESTABLISH RECYCLING AND MATERIAL REUSE PROGRAMS.
3. ACHIEVE COOLING EFFICIENCES THROUGH PROGRAMS SUCH AS HOT AISLE/COLD AISLE, USE OF BLANKING PANELS, PROPER VENT PLACEMENT AND PARTITIONING OF THE SPACE.
4. RAISE DATA CENTER AMBIENT TEMPERATURE.
5. BUY MORE EFFICIENT SERVERS, POWER DISTRIBUTION UNITS AND UNINTERRUPTIBLE POWER SUPPLIES.
6. BUILD NEW DATA CENTERS TO GREEN STANDARDS.
7. APPOINT A GREEN IT CZAR.

- Adopt recycling and reuse programs.
- Think about alternative sources of energy.
- Encourage videoconferencing to reduce air travel.
- Cut back on ground travel.
- Pressure vendors to demonstrate that they have green strategies.
- Finally, don't be fooled by "green-washing." These days, every vendor claims to be green. Be sure to verify those claims.

5. Network access control: After the shakeout

NAC has been a hot, fun topic for the past couple of years.

Epic standards battles pitted Cisco against Microsoft, each having its own terminology and approaches. And who could forget the Trusted Computing Group, which, with its own architecture, acted as a wild card?

Then there was the horde of third-party vendors offering to handle a company's NAC needs if it didn't want to wait for Cisco and Microsoft to deliver on their promises.

Last year was a turning point for NAC, however. The standards battles appear to have been resolved, and everything looks like it's falling into place. Customers apparently decided to wait for Microsoft to deliver its NAC products — and that left many third-party vendors out in the cold. A lot of them went under, including Caymas Systems and Lockdown Networks.

And because Network Access Protection (NAP, Microsoft's version of NAC) comes with Vista and Windows Server 2008, deciding to go with Microsoft has become a no-brainer for many customers. NAP represents a clear choice, rather than a technology that requires extensive research, RFPs, product tests and evaluations, and so forth.

NAP even proved itself in a recent product evaluation Forrester Research performed to determine which NAC tools would solve real-world deployment problems. Microsoft came in first, followed by Cisco and Juniper Networks.

This year the questions for customers will be where do we deploy NAC, and how many NAC features do we turn on? Most customers today are using NAC just to control guest access. That's important, but the technology can do more. On the pre-admission side, it can scan user devices, determine whether they are clear of viruses, check to see if patches have been updated and quarantine the device if security conditions aren't met. On the post-admission side, it can make sure that a clean machine remains that way, and that users access only those parts of the network to which they have authorization.

These important functions are ones that every IT exec should be implementing.

6. 10 Gigabit Ethernet: A switch in time

In 2001, when 10 Gigabit Ethernet switches were introduced, the average per-port cost was $39,000, according to IDC.

Today, a 10GigE port costs less than $4,000, which makes 10GigE switches affordable for the enterprise wiring closet or data center.

With ongoing data-center server consolidation, not to mention the needs of service providers and high-volume Web sites, standards groups and vendors are hard at work on 40 Gigabit Ethernet and even 100 Gigabit Ethernet. For now, however, 10GigE is the industry standard, and customers are flocking to 10GigE switches. Switch-based 10GigE port shipments grew by 140% in 2007, Infonetics Research reports. Worldwide revenue for 10GigE services and equipment will hit nearly $9.5 billion by year-end, a 30% increase from last year, the firm predicts.

If your Fast Ethernet boxes are becoming stressed, this might be the time to move to 10GigE. Per-port prices are coming down and feature sets are going up. A recent *Network World* test of seven 10GigE switches found these products offer not only powerful packet-pushing capabilities but also 802.1X authentication, enhanced multicast support, protection against denial-of-service attacks and IPv6 support (www.nwdocfinder.com/8126). The test demonstrated that these switches have extensive management and security features, which are just as important as how many packets they can move per second.

7. Virtualization: Beyond the server farm

By now, you've most likely implemented some level of x86 server virtualization. So, the question of the moment is this: Does data-center virtualization on x86 boxes represent the end of your virtualization efforts or just the beginning? What about storage virtualization? What about desktop virtualization? What about application virtualization? What about virtualizing all your data-center hardware including Unix boxes and mainframes?

Those are the key, long-term virtualization questions facing IT executives. Once you've started down the road to decoupling the underlying technology infrastructure from the services you're providing to the business, doesn't it make sense to extend that strategy across the enterprise?

If you're inclined to agree, the next logical step would be storage virtualization, because you're dealing with another technology residing in the data center. The advantages of creating a virtual storage pool include lower-cost data migration, easier storage-resource management, common replication services and the ability to maximize and extend your storage resources.

Client virtualization, which comes in a variety of options, also offers real benefits. In the hosted virtual-desktop setup, applications are hosted on a server and users work on thin-client machines. This would be ideal, for example, in a call center.

In another version of desktop virtualization, one physical machine is virtualized. Here, separate business and personal zones could be cre-

Six virtualization security concerns

1. HOW DO YOU PROTECT THE VIRTUALIZATION LAYER FROM ATTACK — OR EVEN DETECT AN ATTACK?
2. HOW DO YOU ESTABLISH VISIBILITY AND CONTROLS WHEN IT COMES TO INTER-VIRTUAL MACHINE TRAFFIC.
3. HOW DO YOU AVOID CONFIGURATION ERRORS WHEN DIFFERENT TOOLS ARE IN USE FOR SECURING AND MANAGING VIRTUAL MACHINES AND PHYSICAL SERVERS?
4. HOW DO YOU PATCH, CONFIGURE AND PROTECT OFFLINE DISK-BASED VIRTUAL MACHINE IMAGES?
5. HOW DO YOU MAINTAIN THE SEPARATION OF DUTIES THAT EXIST IN THE PHYSICAL WORLD?
6. HOW DO YOU ESTABLISH DYNAMIC SECURITY AND MANAGEMENT POLICIES THAT AREN'T TIED TO PHYSICAL ASSETS?

ated on mobile workers' laptops for security and compliance.

Or multiple operating systems could be run on a single PC. This scenario would apply to engineers, for example, who might be running a specific Unix or Linux-based technical application but using Windows for e-mail and other basic applications.

Most companies today are in the first stage of virtualization, says Gartner analyst George Weiss. This means they're consolidating and virtualizing servers as cost-cutting measures, typically with a single vendor.

The next phase would be using virtualization technology for the dynamic allocation of resources across servers. And the final phase, which won't occur for several more years, is heterogeneous virtualization, the ability to move workloads dynamically across hardware platforms.

8. Cloud computing: Proceed with caution

As we arrive at 2009, cloud computing is the technology creating the most buzz. Cloud technology is in its infancy, however, and enterprises would be wise to limit their efforts to small, targeted projects until the technology matures and vendors address a variety of potentially deal-breaking problems.

First off, let's define cloud computing. Gartner says it is "a style of computing whose massively scalable and elastic, IT-related capabilities are provided 'as a service' to external customers using Internet technologies."

The two most commonly cited examples of cloud offerings come from Amazon.com and Google, both of which basically rent their data-center resources to outside customers.

For example, Amazon's Elastic Computer Cloud (EC2) lets customers rent virtual-machine instances and run their applications on Amazon's hardware. Other services under the EC2 umbrella include storage and databases in the cloud. Amazon uses Xen for virtualization and offers customers a choice of Linux, Solaris or Windows operating systems.

The pitch is that customers can take advantage of Amazon's expertise in running large data centers, that customers pay only for the compute and storage resources they use, and that Amazon can scale up or down easily, depending on the demand.

That's the most basic level of cloud computing — infrastructure in the cloud. In this scenario, the customer is aware of and makes choices concerning the infrastructure itself.

The next level is cloud computing as a Web development platform. The best example is Google's App Engine, a place where Web application developers can upload code (as long as it's written in Python) and let Google's infrastructure take care of deploying the application and allocating compute resources.

The third level is running enterprise applications in the cloud. A cloud vendor could host an enterprise application and take responsibility for that application's availability and performance. Gartner predicts e-mail will become one of the first enterprise applications that move to the cloud.

How is that different from software-as-a-service (SaaS)? Without getting too tangled up in semantics, SaaS typically refers to a specific vendor — Salesforce.com, for example — offering its application to multiple customers in a hosted model. Theoretically, a SaaS vendor could use the cloud infrastructure to host its applications. Also theoretically, a cloud provider could host anybody's application.

TRADITIONAL VS. CLOUD COMPUTING

	Traditional computing		Cloud computing
ACQUISITION MODEL	Buy assets and build technical architecture	>>>	Buy service
BUSINESS MODEL	Pay for fixed assets and administrative overhead	>>>	Pay based on use
ACCESS MODEL	Internal network or intranet, corporate client	>>>	Internet, any device
TECHNICAL MODEL	Single tenant, non-shared, static	>>>	Scalable, elastic, dynamic, multitenant

SOURCE: GARTNER

That brings us to the ultimate cloud scenario, in which these "private" clouds owned by such companies as Amazon and Google melt into one giant, public cloud that contains all the user's data and applications and is accessible anytime on any device.

That's a long way off, however. In addition, the potential roadblocks are many. They include issues of licensing, privacy, security, compliance and network monitoring. A final potential stumbling block is that enterprise applications tend to be customized and intertwined, with one system feeding into or reporting back to another. That makes it pretty tough to pluck out an application and run it in the cloud without affecting every related application.

So for now, keep an eye on the cloud, but keep your feet firmly planted on the ground.

9. Web 2.0: Learn to live with it

The Web 2.0 phenomenon is unstoppable. Employees are turning in droves to blogs, wikis, mash-ups, social networking, crowdsourcing and other variations on the Web 2.0 theme. A recent Yankee Group survey found that 86% of non-IT workers are using at least one consumer Web 2.0 tool at work. As younger workers enter the enterprise workforce, access to Web 2.0 technologies will become only more of a given.

The challenge for IT executives is how best to harness Web 2.0 technologies in a way that's secure; serves such basic enterprise functions as collaboration; and adds to worker productivity, revenue generation and overall business benefits.

Five big hurdles for enterprise use of social network software

1. UNDERSTANDING AND DELIVERING BUSINESS VALUE.
2. OVERCOMING CULTURAL BARRIERS.
3. ENSURING PARTICIPANT PRIVACY.
4. GOVERNING PARTICIPANT BEHAVIORS.
5. MANAGING PERSONAL AND PROFESSIONAL TIME.

SOURCE: GARTNER

The possibilities are endless. A Gartner list of Web 2.0 applications includes answer marketplaces, collaborative product and service design, community-driven self-service, crowdsourcing, idea engines and prediction markets.

Many employees are using such social-networking sites as LinkedIn, MySpace or Twitter to communicate with peers and customers. In addition, a growing number of vendors aim to help companies set up and manage enterprise-grade Web 2.0 applications. For example, WorkLight offers Java-based software that will help authenticate, encrypt, store and manage Web 2.0 applications (see "10 start-ups to watch in '09," page 22). Face Connector (formerly Faceforce) is a mash-up that brings Facebook profile and friend information seamlessly into Salesforce CRM. Socialtext 3.0 provides social networking, wikis and customizable home pages for the enterprise.

That's just the tip of the iceberg. Key is identifying an application that fits with the culture of your company, then making it available and watching as the community takes off. ■

10 people you should know

These power-brokers' decisions could shape IT in the enterprise for years to come

BY ANN BEDNARZ

It's a good time to be an innovator — or in a position to encourage, recognize and reward innovation. And it's a good time to pay attention to the technology agendas of such people. Your company's viability may ultimately be ensured by the innovation these 10 people are driving from the labs to the enterprise.

John Chambers
CEO, Cisco

In a faltering economy, all eyes are on such tech bellwethers as Cisco, watching for signs of health or distress. In November, Chambers confirmed the fears of many industry watchers when he announced sales could fall as much as 10% in the company's current fiscal quarter, which closes at the end of this month. Then he sent the industry into a frenzy with his decision to shut down over the holidays to save money — a first-time move for the company. The timing is lousy, because Cisco is set to move forward with its biggest product launch in years: the Nexus data-center switch platform, unveiled early in 2008. The company spent about $250 million developing Nexus, which has a unified switching fabric combining Ethernet, IP and storage capabilities. The platform is intended to cement a broader role for Cisco in the data center — but Chambers needs early adopters to step up this year. On the positive side, Cisco means a lot more than switching. In its fiscal quarter that ended Oct. 25, the company showed solid growth in its advanced technologies unit, which includes application networking services (a 25% increase year over year), unified communications (+22%), video systems (+21%), wireless (+21%) and security (+19%). Cisco also can draw from its experiences navigating economic slowdowns to get through the current one: "We did this in 1993, 1997, 2001, 2003, and in each scenario we gained both wallet share, and in my opinion, profit share," Chambers told investors in November. "As a result, we were better positioned coming out of these transitions vs. our peers."

Paul Maritz, CEO, VMware

As 2009 kicks off, Maritz is poised to move past the executive turmoil that scuttled VMware's upper ranks during the last several months. It began with Maritz's arrival in July and the ousting of then-CEO Diane Greene; those events were followed in September by the departures of co-founder (and Greene's husband) Mendel Rosenblum, who had been chief scientist, and Richard Sarwal, who led R&D. Then, in November VMware's senior director for security products, Nand Mulchandani, left the company for a start-up. Amid the drama, VMware retooled its desktop virtualization technology and released a new hypervisor for mobile phones. Most significantly, Maritz unveiled plans for

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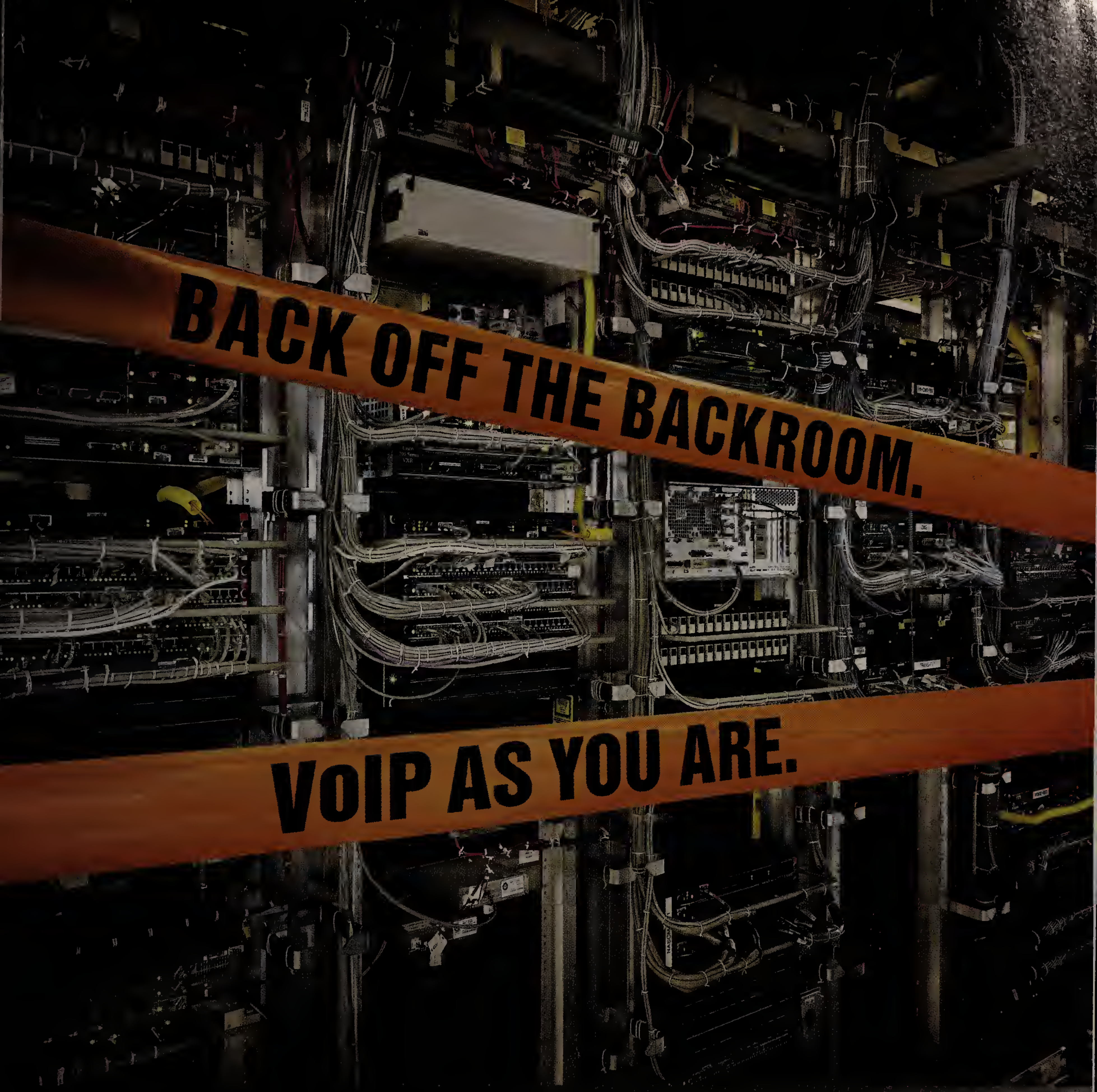

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VMware's expansion in the data center via the Virtual Datacenter Operating System, which is designed to aggregate virtualized servers, storage and network resources into a single pool of computing resources. Components of VDC-OS, including vNetworks and vStorage for managing virtual pools of switches and storage equipment, are expected to ship throughout this year. Looking ahead to the business agenda, Maritz needs to find a healthy tempo as the 10-year-old company completes its transition from a rock-star start-up to a mature vendor with more sustainable — albeit less meteoric — growth. Maritz also needs to fend off hypervisor newcomer Microsoft (his former employer) and increased pressure from Citrix Systems. It's a tall order, particularly in this tough economy, but VMware still enjoys prime market position and a reputation for innovation.

The Google triumvirate

Eric Schmidt, CEO; Larry Page, president of products; Sergey Brin, president of technology

With success comes confidence, and the trio at Google's helm has no lack of either. The company entered new markets in 2008 with the release of its first Web browser — Google Chrome — and it celebrated the arrival of G1, the first mobile phone based on the open source Android platform. For enterprises, Google beefed up its Google Apps platform's service guarantees, and it released a beta version of the Google App Engine, which offers a full-stack platform for building and hosting Web applications on Google servers. For the world at large, the company laid out a $4.4 trillion energy plan to help the United States kick its dependence on fossil fuels. Not every corporate swing connected — Google shuttered its 6-month-old virtual world, Lively, at the end of December and scuttled its plans for an advertising deal with Yahoo in anticipation of antitrust obstacles — but the company's "do no harm" triumvirate made it clear there's not much it won't try. Except perhaps high office: Schmidt said he would not serve as technology czar in President-elect Barack Obama's administration if he were asked.

Mike Neil, general manager of virtualization strategy, Microsoft

Microsoft was undeniably late to the hypervisor game, but it has an ace up its sleeve: Nine out of 10 guest operating systems that run on rival VMware's virtualization platform are Windows servers. So, if an enterprise is running Windows already, why not use Microsoft's Hyper-V server virtualization technology? Making Hyper-V available for free definitely helped generate a buzz when the hypervisor was launched last summer. Nevertheless, the real battle for server-virtualization dominance will be fought over the features that enterprises value most: management, security, availability and performance. As Microsoft's virtualization strategist, Neil has been talking up the multiplatform management features of the newly available System Center Virtual Machine Manager 2008, which lets users configure and deploy virtual machines running on Hyper-V and VMware platforms. Virtualization also is a key part of Windows Server 2008 R2: When R2 ships in 2010, it will include a much-anticipated live migration feature that was pulled from the first release of Hyper-V. In addition, there's the desktop, where Microsoft is aiming its new App-V application-virtualization solution. In classic Microsoft form, the company isn't letting its late-entry status dampen its market ambitions.

Steven Sinofsky

Senior vice president of the Windows and Windows Live engineering group, Microsoft

A scarcity of details about Windows 7 has served only to heighten interest in the forthcoming client operating system that will succeed the less-than-celebrated Windows Vista. Leading the charge to get Windows 7 out the door is Sinofsky, who presided over the first public demonstration of the operating system in November and has pledged not to make promises the Windows 7 team can't deliver: "We, as a team, definitely learned some lessons about 'disclosure' and how we can all too easily get ahead of ourselves in talking about features before our understanding of them is solid," he blogged in August 2008. "Our intent with Windows 7 and the pre-release communication is to make sure that we have a reasonable degree of confidence in what we talk about when we do talk." What is known is that Microsoft is building the operating system on the Windows Vista code base to avoid the sort of application compatibility problems that plagued Vista early in its release. Among the expected features of Windows 7 are revamped application security, data security and deployment features; and Microsoft has dropped hints of a more modular operating system and performance boosts. There's no firm release date for Windows 7, but Microsoft has said it will arrive by January 2010. Sinofsky's hard-earned reputation for getting new versions of Microsoft Office out the door on a regular, 18-month schedule bodes well for an early arrival.

> "We, as a team, definitely learned some lessons about 'disclosure' and how we can all too easily get ahead of ourselves in talking about features before our understanding of them is solid."

John Lilly, CEO, Mozilla

Everyone loves an underdog story, and Mozilla's hasn't disappointed. The Firefox browser started stealing away Internet Explorer users in 2004; today it has an estimated 20% share of the browser market, due largely to its latest release. Mozilla hit a home run with Firefox 3, which ran up 8 million downloads in the first 24 hours it was available. Meanwhile Microsoft's Internet Explorer, which held a

Outlook '09 online. Flip through a slide show of these 10 IT leaders to watch. www.nwdocfinder.com/8128 rock-solid 95% market share in 2004, has about 71% today, according to Web-metrics company Net Applications. The challenge for Lilly, who took on the CEO role just one year ago, is keeping the Mozilla community innovating and advancing the features that enterprises want to see in such products as Firefox, the Thunderbird e-mail client and Firefox Mobile, which is expected to be released to the public this year. On the business side, Lilly needs to fend off competition from Chrome, another fledgling browser, while maintaining a healthy relationship with Chrome's owner, Google — which, through a 3-year-old search partnership (renewed through 2011), drives the bulk of Mozilla's revenue.

Sheryl Sandberg
Chief operating officer, Facebook

Can Facebook make the transition from dorm room to boardroom? That's the central challenge for COO Sandberg, who once served as chief of staff for the U.S. Treasury Department and most recently spent six years at Google, where she headed online sales and operations until March 2008. Sandberg's charter at Facebook is to help scale its operations and expand its presence globally (seven months after Sandberg's arrival, Facebook established an international headquarters in Dublin). Her vision for Facebook includes adding enterprise applications to the social-networking site; she recently helped promote a new partnership with Salesforce.com that encourages developers to design business-oriented applications that appear natively on Facebook but are built using Salesforce.com's platform and hosted on the application vendor's servers. Still, Facebook's enviable stats —more than 120 million active users and the fourth most-trafficked Web site in the world — don't guarantee a welcome reception from enterprise IT teams, which will have to weigh security, privacy and productivity concerns before sanctioning Facebook for business use.

> “Enterprises should have called 'uncle' a long time ago. It's impossible to be experts on every nuance, every new regulatory control, every new hacker threat.”

Joshua Corman,
principal security strategist, IBM Internet Security Systems division

Corman doesn't resort to the fear, uncertainty and doubt that so many IT security vendors use to scare up interest in their products. Instead he speaks candidly about the trouble enterprise security teams are in: “Enterprises should have cried 'uncle' a long time ago. It's impossible to be experts on every nuance, every new regulatory control, every new hacker threat,” he said in a November interview with *Network World*. He's also candid about the need for greater transparency in exposing threats: “We've seen the gap getting bigger and bigger between the threats and our countermeasures. Who are we helping by keeping these things to ourselves?” Far from acting like someone whose start-up mind-set has atrophied while working for a big vendor like IBM, Corman is energized by the opportunity to strategize about security with his Big Blue peers who are shaping such key enterprise technologies as x86 server virtualization and cloud computing. Looking ahead, he hopes to see a renewed focus on risk management and less dependence on regulatory compliance as a security crutch.

Kenneth Brill, executive director, Uptime Institute

Data centers' energy consumption is unreasonably high — and headed toward unsustainably so. In a survey conducted by Brill's data-center research and advisory organization Uptime Institute, 65% of respondents said their centers would run out of power capacity in two to five years. Cooling capacity likewise is in short supply. Nonetheless, the answer isn't building bigger data centers with greater capacity, Brill says. Fortunately for budget-constrained buyers, something as simple as smarter shopping could go a long way toward alleviating the problem. “When you're buying new IT hardware anyway, make energy efficiency a key part of the procurement process,” he says. A more energy-efficient server can cut consumption by 20%, conservatively, and possibly by as much as 50%. One key tip Brill offers is to look at the energy efficiency of a server's power supply — specifically when it's operating between 8% and 20% of capacity. That's the actual load, and “that's where they are atrociously inefficient,” he says. If a company can lower the energy consumption of data-center gear, it will not only save on its energy bills but also — much more significantly — slash the capital and operating costs of running the center. “Energy consumption is significant and certainly we should look at it,” Brill says. “But the more important thing is that the cost of operating a data center scales with energy consumption.” For 2009, Brill is pushing senior enterprise leaders to commit to reduce energy consumption significantly — because their business depends on it: “We think people who don't pay attention to these issues are going to see a meaningful reduction in their profitability.” ■

Amit Jasuja
Vice president of product development for identity management, Oracle

Oracle aims to be the undisputed leader in identity and access management, and Jasuja is driving the charge. Coordinating the campaign is no small feat, however, given the complexity of IAM and all its components: user account provisioning, password management, role management, single sign-on, authentication services, federated access management, entitlement management and more. In 2008 Oracle released key products in its push to deliver services-based identity capabilities that can be tapped by multiple sources rather than being hard-coded into enterprise applications. Its Entitlements Server, for example, lets users centrally manage security and regulatory policies for enterprise applications and Web services, rather than embedding those policies into the code of individual applications. Another highlight is the release of Oracle Adaptive Access Manager, which uses such real-time factors as a user's geographic location and device attributes to render context-based authentication. “There's a reason why Oracle is both the leader and the leading innovator in identity management today, and products like OAAM (and people like Jasuja) are the proof,” says Dave Kearns, author of *Network World's* twice-weekly Identity Management Alert newsletter (www.nwdocfinder.com/8127).

10 start-ups to watch in '09

BY JON BRODKIN

These 10 companies offer interesting twists on everything from managing application performance across a virtual infrastructure to adopting public Web 2.0 technologies for use in the enterprise.

Arista Networks

Founded: October 2004

Location: Menlo Park, Calif.

What it offers: The Arista 7148SX, a high-density, 10 Gigabit Ethernet data-center switch with a customizable network operating system.

Why we're watching it: Arista is as notable for its people as for its technology. Andy Bechtolsheim, Sun co-founder and former chief architect, co-founded Arista and serves as the company's chief development officer. Arista CEO Jayshree Ullal most recently ran Cisco's $10 billion Data Center, Switching and Services Group — experience that could prove crucial as Arista (formerly known as Arastra) challenges Cisco for switching supremacy. Arista will try to lure customers with blazing-fast switches that pack 48 10Gig Ethernet ports into one rack unit for a relatively inexpensive $400 per port. Arista's founders expect such products as the company's switches to become more important over the next year with the development of next-generation servers capable of taking full advantage of 10Gig Ethernet speed and new applications requiring greater bandwidth and lower latency.

How the company got its start: The founders saw a need for high-density, cost-effective 10Gig Ethernet products that could provide such benefits as improved network performance and lower latency.

How the company got its name: Arista is from the Greek word meaning "the best."

CEO: Ullal left Cisco in May 2008 after 15 years at the company. An industry icon, she was named one of *Network World's* 50 most powerful people in 2005 (www.nwdocfinder.com/8122).

Funding: Undisclosed amount from Bechtolsheim and David Cheriton, a Stanford University professor of computer science and electrical engineering who is widely known in networking and distributed systems.

Who uses its product: Customers include BitGravity, Lawrence Livermore National Laboratory and Northwestern University.

Axxana

Founded: September 2005

Location: Tel Aviv, Israel

What it offers: Phoenix, a 400-lb. "black box" designed to protect an enterprise's most critical data from terrorist attacks and natural disasters, then transmit that data wirelessly in the wake of such an event. Axxana is expected to deliver Phoenix early this year.

Why we're watching it: Using flash memory in a box designed to survive anything short of nuclear attack, Axxana's Phoenix represents a new mode of data protection and disaster recovery. "It's very telling of the times that we would consider products of this type," says analyst Arun Taneja, founder of Taneja Group, who says Axxana's approach impresses him but notes that the company faces a big challenge in convincing enterprises that its product is as reliable as it claims. After all, if a disaster happens and "it doesn't work, it's too late," he says.

How the company got its start: Founders wanted to solve problems inherent in synchronous and asynchronous mirroring. Asynchronous mirroring allows replication of data to another site no matter how far away, but some bits of data get lost. Synchronous mirroring transmits data without loss, but the technology is limited to a distance of about 45 miles, affects application performance and is expensive.

How the company got its name: Axxana means storage in Hebrew.

CEO: Eli Efrat is a serial entrepreneur who co-founded Axxana and Veon, a digital video and Internet company acquired by Philips Electronics. He

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Outlook '09 online. See a slide show with [illegible] from these 10 start ups to watch. www.nwdocfinder.com/8121

DNS CHANGE MAKERS

LIU'S VIEW.

Mastering DNS has always been challenging — some would say it's as much art as science. And while I'm thrilled that DNS plays a key role in essentially all network applications, I'm concerned by current trends. We're now seeing more frequent attacks against DNS infrastructure. Recently, for example, we saw a spate of what are referred to as "DNS amplification" attacks in which open recursive name servers are used as amplifiers to swamp targets on the Internet. Turns out that name servers are terrific amplifiers — you can get an amplification factor of nearly 100x. These attacks have raised awareness of the vulnerability of Internet name servers, which is possibly the only positive result.

Dealing with DNS issues is becoming a full time job for organizations. My company, Infoblox, provides leading edge products to help IT managers better handle their DNS network management challenges.

When I need an answer fast, I go to a source I trust — DNSstuff.com. Comprehensive troubleshooting and problem solving tools in one place. That's powerful. Think all DNS tools are the same? Think again.

Cricket Liu, DNS guru, author & VP of Architecture, Infoblox

DNSstuff.com
WHEN GOOD ISN'T GOOD ENOUGH.

10 start-ups, continued from page 22

also served as CEO for mobile instant-messaging vendor MessageVine.

Funding: $5 million in one round, closed June 2007, from Gemini Israel Funds.

Who uses its product: Companies in the financial, government, healthcare, manufacturing and retail industries have expressed interest in Phoenix, which also could be attractive to data-center service providers, Axxana says.

BlueStripe Software

Founded: June 2007

Location: Morrisville, N.C.

What it offers: FactFinder, software that helps IT manage application performance and availability when a company uses VMware virtual servers (www.nwdocfinder.com/8123).

Why we're watching it: FactFinder automatically details all components and processes an application connects to and depends on, following an application through physical and virtual environments and detecting performance problems. With virtualization gaining adoption in both large and small businesses, this capability will become ever more crucial. The BlueStripe technology works only with VMware, but the company plans to add support for Citrix Systems and Microsoft virtualization products. BlueStripe's technology is promising, but the vendor may find it difficult to cut through the widespread hype about virtualization. For example, the most recent VMworld conference attracted more than 200 sponsors and exhibitors.

How the company got its start: By making visible the relationships among applications and their underlying physical and virtual infrastructures, the founders hoped to alleviate common concerns about moving business applications onto virtual machines.

How the company got its name: The founders attended rivals Duke University and the University of North Carolina, so they placed the colleges' team colors (two shades of blue) in the company's logo.

CEO: Chris Neal, a co-founder, was vice president of field operations at Wily Technology. While there, he helped guide the company through a period of major growth culminating in Wily's 2006 acquisition by CA.

Funding: $5 million in one round, closed December 2007, from Trinity Ventures.

Who uses its product: Square 1 Bank, among other companies in the financial, insurance and telecom industries.

FastSoft

Founded: March 2006

Location: Pasadena, Calif.

What it offers: FastSoft E Series, an appliance that accelerates the speed of data transmissions over the wide area.

Why we're watching it: At first glance, FastSoft might be confused with other WAN-acceleration wannabes, writes Larry Chaffin, a consultant and *Network World* Cisco Subnet blogger (www.nwdocfinder.com/8124). FastSoft, however, distinguishes itself in part by requiring that only one box be installed in the data center, he notes. FastSoft's technology requires no hardware or software at the data's destination points, and accelerates transfers by optimizing the TCP protocol to be more intelligent in pacing and maintaining the flow of the data, the vendor says. FastSoft promises to improve transmission speeds by as much as a factor of 30, without requiring that the data's endpoints be controlled or that caching or compression be used.

How the company got its start: The founders wanted to solve the problems related to TCP's packet-loss limitations, noting that "the transfer of large files is seriously hindered by TCP, the protocol that governs more than 90% of Internet traffic."

How the company got its name: Derived from "fast software," referring to the company's first product, software called FastTCP.

CEO: Co-founder Steven Low is acting CEO. He is a professor of computer science and electrical engineering at the California Institute of Technology (Caltech), where he developed FastSoft's technology with fellow co-founder Cheng Jin.

Funding: $4.3 million in a first round, closed June 2007, from angel investors, Caltech and Miramar Venture Partners.

Who uses its product: Customers include Getty Images, Technicolor's digital distribution division and Honda, which uses FastSoft to transfer large files between Los Angeles and Tokyo.

RingCube Technologies

Founded: October 2005

Location: Mountain View, Calif.

What it offers: vDesk, desktop virtualization software that gives users remote access to a personalized desktop from any computer, through such devices as USB drives or BlackBerry personal digital assistants.

Why we're watching it: RingCube's unique architecture improves the mobility of desktop virtualization and reduces storage requirements, says Chris Wolf, a Burton Group analyst. Unlike VMware's desktop virtualization offering, which creates a separate Windows operating system installation for each desktop instance, vDesk uses the existing Windows operating-system kernel, reducing storage needs and Windows licensing costs, Wolf says. In the future, RingCube will have to show vDesk's scalability and integration with such management platforms as HP OpenView, he says.

How the company got its start: The founders wanted to free users from being tied down to a single PC containing all their applications, data and personalized settings.

How the company got its name: Originally it was called RingThree, referring to the outer protection ring in x86 processors. Then the founders replaced "three" with "cube," referring to the mathematical process of raising a number to the third power.

CEO: Pete Foley, chosen for his success in expanding start-ups and small companies, was most recently CEO of security vendor Port Authority Technologies (now Websense).

Funding: $16 million, including a $12 million second round closed March 2007, from New Enterprise Associates and Mohr Davidow Ventures.

Who uses its product: Adobe, Intelligent Software Solutions, Regis University and Southcoast Community Bank.

Skytap

Founded: August 2007

Location: Seattle

What it offers: The Skytap Virtual Lab Platform, an Internet-based virtual laboratory for application development and testing or IT-operations testing. With just a Web browser, users can upload their own virtual machines and run them on Skytap's service or access "prebuilt virtual-machine images of major operating systems, databases, applications and test tools," Skytap says.

Why we're watching it: Skytap offers more lab-testing options than existing cloud-computing services such as Amazon.com's Elastic Compute Cloud, says John Bass, a *Network World* tester and technical director for Centennial Networking Labs at North Carolina State University. "With EC2, it's more like 'here are the things you can do,'" Bass says. "With Skytap, you have the ability to modify the images that run on the virtual machines. You can change the browser and the operating system parameters. It's much more flexible." An appropriate Skytap package might cost considerably more than EC2, Bass says, but could eliminate a company's need to buy a bunch of servers for testing a large-scale application deployment.

How the company got its start: Skytap was founded by University of Washington professors who wanted to make virtual machines easily accessible over the Internet and simplify the process of running an IT lab.

How the company got its name: Meant to suggest tapping into the unlimited computing resources available through the cloud.

CEO: Scott Roza, who was chosen for his strong track record with start-up companies, as well as his technology and marketing expertise, the company says. He was previously vice president of worldwide OEM and channel sales with Opsware, then at HP, which acquired Opsware in October 2007.

Funding: $6 million in one round, closed August 2007, from Bezos Expeditions, Ignition Partners, Madrona Venture Group and Washington Research Foundation Capital.

Who uses its product: AdmitOne Security, Buildingi, Resolute Software, Savvis and VDIworks.

Soonr

Founded: May 2005

Location: Campbell, Calif.

What it offers: Soonr is a Web-based service that lets mobile workers access and use documents from their office computers through other Internet-connected devices, computers, BlackBerries and iPhones.

Why we're watching it: Soonr promises to make sharing, reviewing, revising, printing and sending documents easier for on-the-go workers. "Soonr is trying to address the issue of anywhere and anytime access to information. It's very easy to state that, and it's very hard to actually do it," says Gerry Purdy, a Frost & Sullivan mobile and wireless analyst. Soonr is helping enterprises inch along the path toward giving users a "cloud" of information they can access from anywhere, but it can expect heavy competition, particularly if traditional backup vendors move in this direction, he says.

How the company got its start: While working for NetObjects, co-founder Martin Frid-Nielson faced numerous communications and collaboration challenges managing five offices on three continents. He felt these challenges could be solved through the better use of mobile technology.

How the company got its name: The service lets mobile workers get their work done sooner.

CEO: Patrick McVeigh has extensive experience with mobile technology, having been CEO of PalmSource, a maker of mobile-handset operating systems; and founder and CEO of OmniSky, which provided wireless data services to such carriers as AT&T Wireless and Verizon.

Funding: $16.5 million, including a $10.5 million second round closed January 2008, from backers Cisco, Clearstone Venture Partners, Intel Capital and Presidio STX.

Who uses its product: CSL, Meltwater and Telia. Soonr's technology also is delivered as part of Cisco's WebEx PCNow remote desktop access product.

Symplified

Founded: September 2006

Location: Boulder, Colo.

What it offers: Symplified Access, a Web-hosted, subscription-based access-management program that offers single sign-on (SSO) and compliance capabilities for software-as-a-service (SaaS) and in-house Web applications.

Why we're watching it: As SaaS takes on a greater role in the enterprise, Symplified will help allay concerns about using software that's outside the firewall by controlling who may use applications and how. "What is interesting about its approach is that it uses a SaaS framework itself," says Jeffrey Kaplan, who runs the consulting firm ThinkStrategies. "You buy it on a subscription basis ... and scale it up or down based on your needs," he says. Symplified's biggest challenge is competition, with such companies as Conformity, OutProtect, Ping Identity and Tricipher also tackling SSO control of access to software-as-a-service applications, he says.

How the company got its start: Founders wanted to solve the problem of providing identity and access management for Web applications without great cost and complexity.

How the company got its name: "Symplified" was chosen because co-founder Eric Olden believes that "the single biggest barrier to enterprise IT is complexity."

CEO: Olden founded Securant Technologies, which made the Web access-management product ClearTrust and was acquired by RSA Security in 2001. He co-authored the AuthXML standard, which forms the core of the Security Assertion Markup Language standard.

Funding: $7 million, including $6 million in a second round closed October 2007, from Allegis Capital and Granite Ventures.

Who uses its product: Symplified is targeting large enterprises that use multiple SaaS applications; several are in pilot tests, the company says.

WorkLight

Founded: February 2006

Location: New York

What it offers: WorkLight, a series of server software products that securely transfer corporate data to popular consumer Web-based applications, such as Facebook, and devices, such as the iPhone.

Why we're watching it: WorkLight will make it easier for enterprises to adopt Web 2.0 technology by connecting them to existing collaboration technologies widely available on the Web. Instead of buying and installing a separate social-networking software package, for example, London's Standard Chartered Bank settled on WorkLight because it enables the secure use of Facebook — which many of its workers already used. WorkLight lets businesses use such Web tools as Facebook in such a way that sensitive data is never visible to non-employees and is not stored on public servers.

How the company got its start: The founders wanted to bridge the gap between business computing and the enjoyable, easy-to-use aspects of home computing in the Web 2.0 era.

How the company got its name: The founders believe work should be easy, or "light," with the use of lightweight applications that solve persistent business problems.

CEO: Shahar Kaminitz, a co-founder, was previously a senior executive at Amdocs, where he started that company's e-business applications group.

Funding: $17 million, including $12 million in a second round closed April 2008, from Genesis Partners, Index Ventures, Pitango Venture Capital and Shlomo Kramer, a security industry executive.

Who uses its product: Undisclosed.

Zscaler

Founded: November 2007

Location: Santa Clara, Calif.

What it offers: Zscaler's Web-based security service, the Global Security Network, eliminates the need for multiple point-security products by redirecting an enterprise's Web traffic to one of Zscaler's data centers and blocking or allowing traffic based on policies determined by that company.

Why we're watching it: With data centers distributed throughout the United States and worldwide, Zscaler has done an excellent job building a scalable infrastructure to support customers without a noticeable performance hit, says Peter Firstbrook, a Gartner analyst. "Obviously, Web threats are very hot right now, and so is outsourcing and reducing IT spending. All those things play into its favor," he says. Businesses based in a single physical building may not need Zscaler, but the service is ideal for customers that have to support mobile users, home PCs or branch offices, Firstbrook adds.

How the company got its start: Founder and CEO Jay Chaudry wanted to simplify the typical enterprise gateway, which he says is cluttered with too many hard-to-manage security products.

How the company got its name: Z stands for "zenith," signifying the highest levels of scalability.

CEO: Chaudry is a longtime entrepreneur and technology executive who launched the companies Air2Web, AirDefense, CipherTrust, CoreHarbor and SecureIT. He also has held executive roles at IBM, NCR and Unisys.

Funding: Zscaler is funded privately by its founders.

Who uses its product: AirTel, The Weather Channel, Wipro and Xoriant.

Outlook '09 online. Vote for your favorite among these 10 start-ups.
www.nwdocfinder.com/8141

IT BUDGET '09

Spending down, contingencies at the ready

BY BETH SCHULTZ

When the economy turned sour in late 2008, IT executives responded as you would expect — by scaling back their 2009 spending plans. In a survey of *Network World* readers, roughly a third said they will keep IT spending at 2008 levels, while 43% said they will spend less.

The situation isn't pretty. Of the IT pros who said they are cutting back, 43% are chopping 5% to 9%, but a whopping 40% are slicing 10% or more (see "2009 IT budget capsule," opposite page). Spending reductions, of course, are not always a bad thing. When IT is done right, lower business expenses can result. More than half of the respondents, however, say their budgets this year will fall short of business needs.

Business-critical projects are still getting the green light, albeit timelines might be stretched, but discretionary spending is getting squeezed, and many shops are in contingency mode, IT execs said in follow-up interviews.

That's the case at Robert Bowden, says Lowell Wright, telecom manager at the building materials supplier in Atlanta.

Had the economy not tanked, all employees would now have new PCs on their desktops, Wright says. Instead, IT has elongated the refresh cycle, rolling out new workstations to 25 users at a time. The good news is that with vendors pricing desktops so aggressively, the company isn't suffering from the loss of volume discounts, he says.

Curbing discretionary spending also brought Robert Bowden's virtualization project to a standstill, Wright says. Designed to increase server utilization rates and deliver application efficiencies, virtualization isn't really do-or-die for the company, so Robert Bowden has backed off its deployment timeframe. Buying the necessary servers for testing just isn't feasible now, he says. "We're just taking a step back. We're not harming the business."

Indeed, "do no harm" might well be this year's mantra as IT executives try to make do.

Stephen Fugale, CIO at Villanova University, certainly has applied that logic in his planning for the next fiscal year, which begins June 1. He doesn't intend to back off strategic initiatives, but a contingency budget he's crafted squeezes spending by 10%. On a current budget of $15 million, that means finding $1.5 million worth of cuts at the school, a large Catholic university just west of Philadelphia.

Untouchable are the university's student-recruitment application (equivalent to CRM software in the corporate world), portals and collaboration. "These speak to our competitive ability, especially given the decline we'll likely see beginning next year in the number of high school seniors applying to private institutions," Fugale says.

Still important but subject to a slower deployment pace will be projects aimed at bringing such enhanced capabilities as podcasting and videoconferencing into the university's 150 classrooms. On the upside, Villanova already has 475 commodity Internet connections, is 80% wireless, and has a new phone system and some recent network upgrades — so Fugale will be able to "hold the fort" on the physical infrastructure, he says.

On the chopping block is spending on consultant work, certain types of maintenance, PC and laptop refreshes, and new or replacement hires.

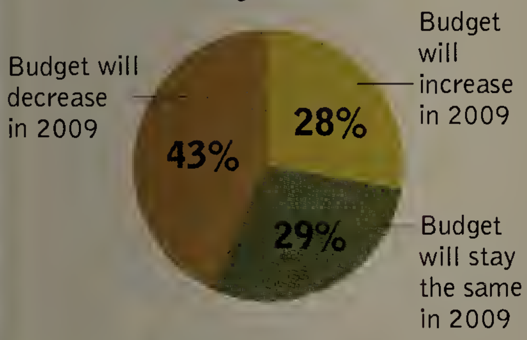
Spending on process improvements is key, IT execs say. More than half of the IT professionals surveyed by *Network World* said such spending can help offset the impact of the business downturn (see "IT spending in the business downturn," opposite page).

And with a tough market that probably will get tougher as 2009 unfolds, companies are going to need all the help they can get. As Fugale says, "It is gloomy." ■

2009 IT BUDGET CAPSULE

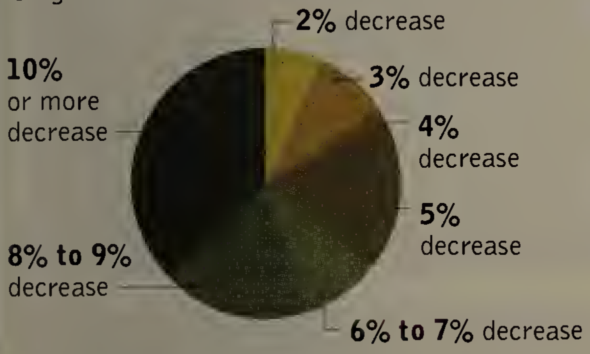
Budget contraction

Although nearly a third of the IT professionals surveyed said they will maintain spending at 2008 rates, the bulk of those that are changing their spending plans are ratcheting costs down.



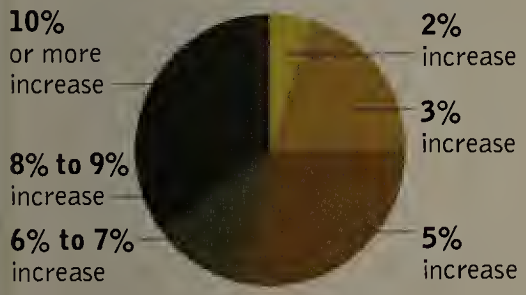
Some nipping, some serious tucking

Of those IT pros who say they are cutting back their IT budgets, 43% are chopping 5% to 9%, while a whopping 40% are slicing 10% or more.



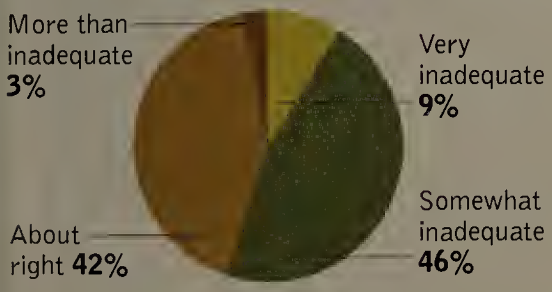
Some are thinking big

Of the IT pros who said they would increase their budgets, more than a third said they upped their 2009 budgets by 10% or more, while another 41% said their increases fell at 5% to 9%.



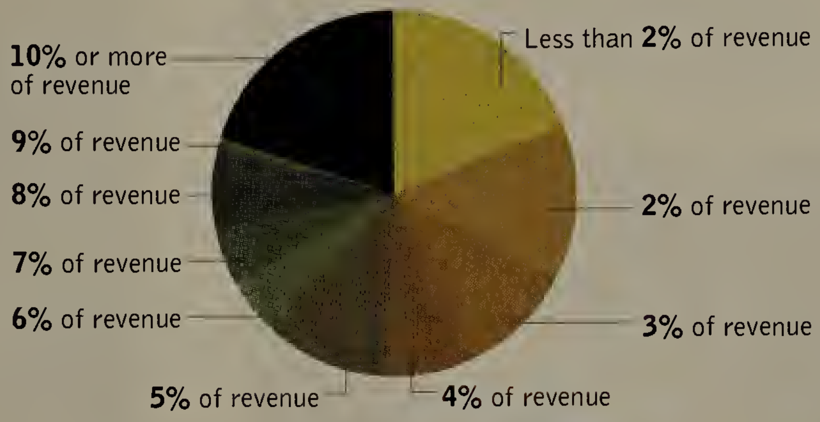
But more than half are left wanting

Relative to your needs, your 2009 IT budget is…

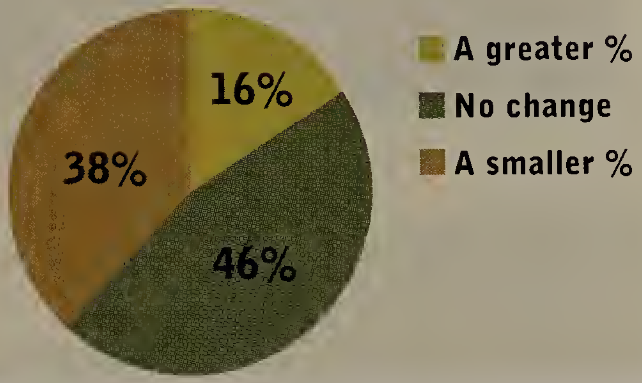


IT SPENDING AS A PERCENTAGE OF CORPORATE REVENUE

No surprises here. The bulk of respondents spend up to 8% of their revenue on IT, which is in keeping with conventional wisdom (retailers, for example typically spend 1% or less, while financial service firms are at the other end of the spectrum). But the telling figures…

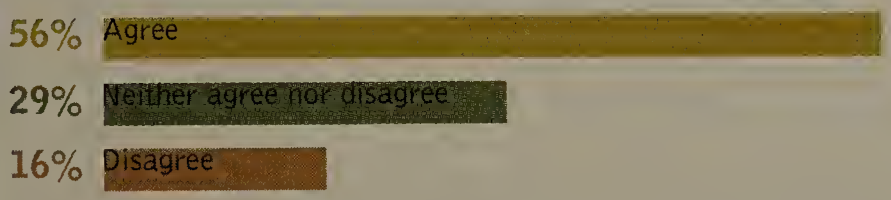


… when asked to compare the 2009 ratio to 2008 spending, the bulk — 84% — said the the percentage of revenue allocated to IT will stay the same or shrink this year.

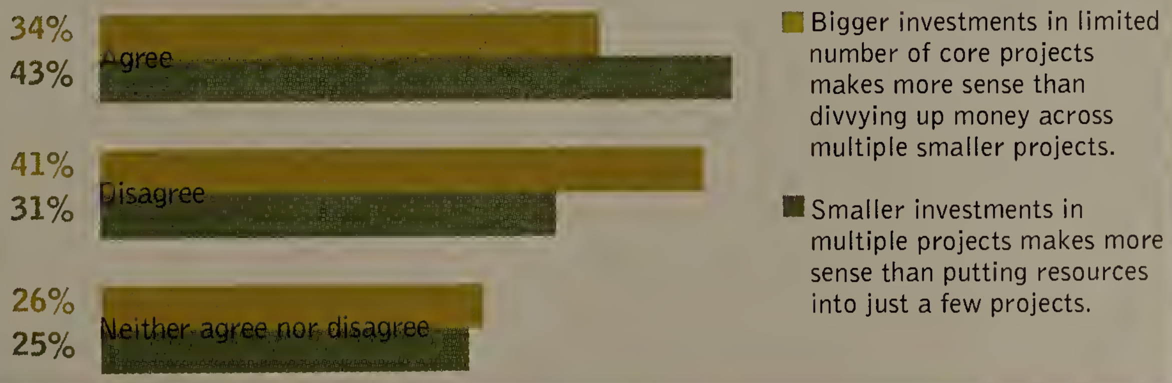


IT SPENDING IN THE BUSINESS DOWNTURN

Most IT pros agree that IT spending to improve processes can help offset the impact of the business downturn…



… but there is little consensus on how to best use IT budgets. Some will forego major investments and instead spend on smaller projects aimed at getting more out of what they've already deployed. Others are earmarking funds for one or two major IT projects aimed at core business improvements.



2009 *NETWORK WORLD* BUDGET SURVEY; *NETWORK WORLD* TECHNOLOGY OPINION PANEL, 144 RESPONDENTS; RESPONSE RATES VARY BY QUESTION

NUMBERS DO NOT EQUAL 100% DUE TO ROUNDING.

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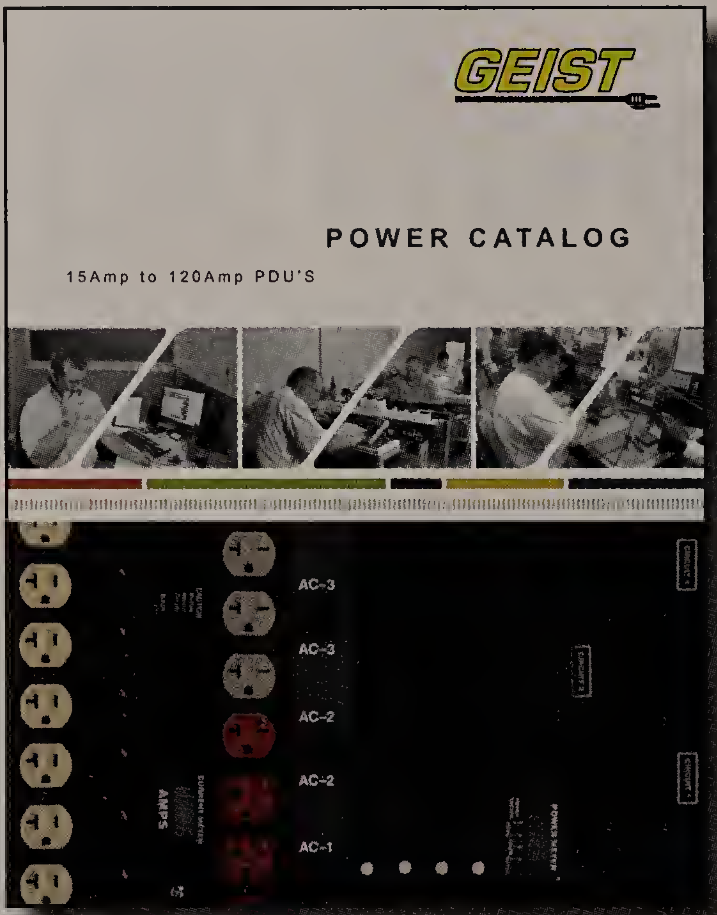

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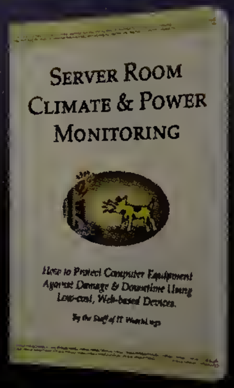

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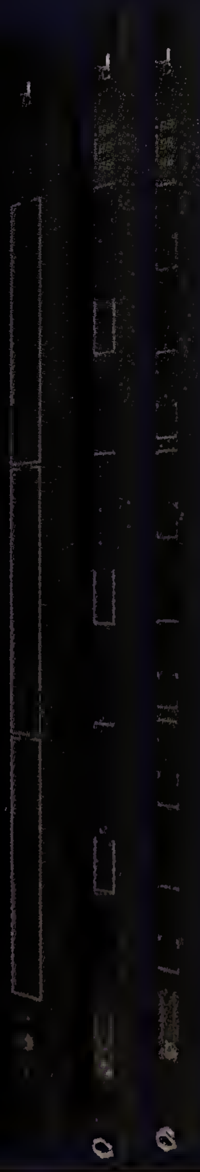

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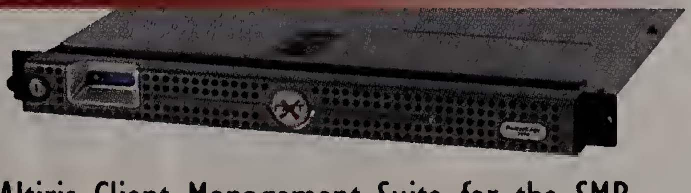

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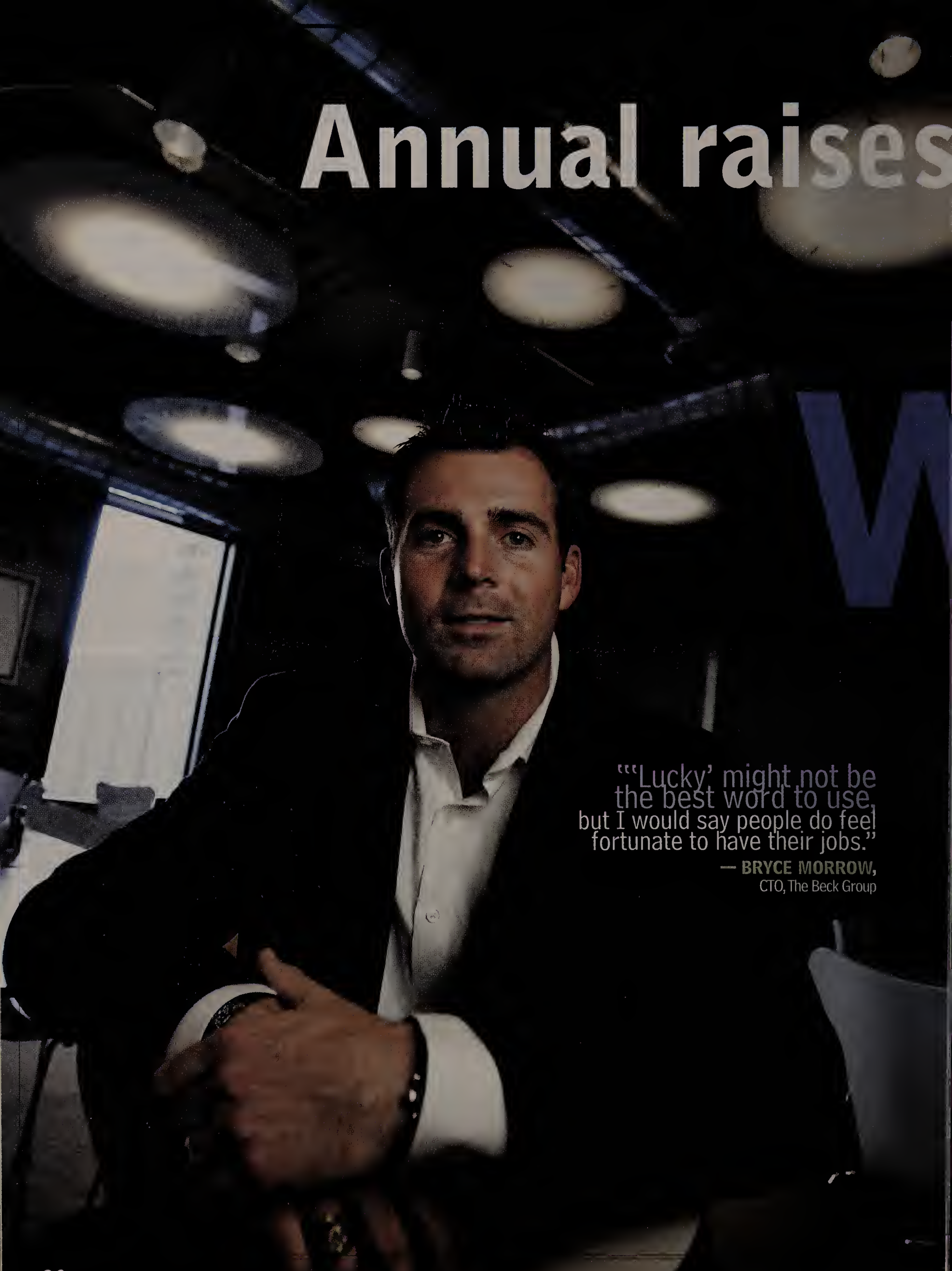


> "'Lucky' might not be the best word to use, but I would say people do feel fortunate to have their jobs."
>
> — **BRYCE MORROW,** CTO, The Beck Group

fall short, leaving IT pros to grin and bear

Even as IT executives strove to meet annual cost-of-living increases, they knew many professionals would be dissatisfied with overall compensation, our annual salary survey shows

BY BETH SCHULTZ

With the roiling effects of the economy churning their organizations, IT executives entered 2009 with protective blankets thrown over employee pay.

As 2008 ended, they pulled back on some major expenditures and slashed discretionary spending — but most tried not to cut pay. Instead they froze salaries at 2008 levels, ratcheted down increases or deferred raises until stability returns.

It may be for naught, however. "If the economy continues spiraling downward, budget problems could be exacerbated, and not touching pay could get tougher," says Stephen Fugale, CIO at Villanova University.

Many IT professionals entered 2009 knowing they'd see either no salary increase or, in a few cases, a salary reduction, the results of the *Network World* Salary Survey show. In the survey, conducted in mid-September, one-third of the 1,854 participants said their 2009 pay will stay at 2008 levels, while 3% said their pay will slide downward. The rest are getting raises, with the bulk of the group (80%) seeing increases of 4% or less. For a point of reference, the inflation rate hovered at around 3.7% at year-end.

When the anticipated hikes and cuts are added up and an average is taken, respondents expect a 2.3% salary increase for the year, pushing base pay for the group from $86,800 to $88,800 on average.

Even those at the top of the IT ladder are looking at small raises. Salaries for senior-most IT executives are expected to climb 2.9% on average, bringing pay at that level to $120,800. That compares to 2.3% hikes for middle managers, whose average pay will inch up to $93,700; and 2.1% increases for staffers, who will make $78,400 on average this year. (To see how your pay stacks up, go to www.nwdocfinder.com/8133 and use our interactive salary calculator.)

Survey respondents clearly aren't satisfied with the trend. When they ranked their satisfaction with 10 job factors, an annual raise came in at No. 8. As one respondent says, stomaching a 3% salary increase can be tough when your group has optimized business processes to the tune of hundreds of millions of dollars. In fact, respondents aren't too pleased

YOUR PAY As the economy plunged, so too did annual raises planned for this year. Salary increases for network professionals fall well below the 3.7% inflation rate for 2009, with an average hike of 2.3%, according to results of the *Network World* Salary Survey.

JOB LEVEL		2009 AVG. SALARY*	% CHANGE FROM 2008 AVG. SALARY
IT SENIOR MANAGERS (CIO/CTO/CSO/SVP)		$120,800	2.9%
	CIO/CTO/CSO/CISO/senior VP of IT	$120,800	2.9%
MIDDLE MANAGERS		$93,700	2.3%
	Web application development director manager/strategist	$105,200	1.4%
	IT security director/manager/strategist	$103,200	2.6%
	Telecommunications director/manager	$99,800	2.1%
	LAN, WAN or network director/manager	$92,200	2.4%
	IT/IS director/manager	$87,900	2.4%
STAFF		$78,400	2.1%
	Security architect/administrator/manager	$93,900	2.3%
	Web application or other application programmer/developer	$88,200	1.8%
	Network architect, designer, analyst or database/systems administrator	$88,100	2.2%
	Data center manager/architect or storage administrator/manager	$81,100	1.7%
	LAN, WAN or network administrator/manager	$70,000	2.3%
	Network operator, technician or other network operations staff	$64,800	2.1%
	Trainer, help desk, tech support	$51,900	2.4%
TOTAL	All respondents	$88,800	2.3%

*PROJECTED MEANS. SOURCE: *NETWORK WORLD* SALARY SURVEY; 1,854 RESPONDENTS

Outlook '09 online. Get more salary details, including a look at bonuses and other compensation. www.nwdocfinder.com/8135

with overall compensation and benefits. These came up at No. 1 and No. 2 respectively when respondents ranked job factors by importance, but at No. 5 and No. 4 in the satisfaction ranking.

Almost half the respondents said they feel underpaid, while only 20% said their compensation packages are more competitive than packages they would receive elsewhere. The remaining 33% said they felt comparably compensated.

In this economy, however, being dissatisfied with raises and compensation isn't enough to turn people against their employers. A whopping 97% of respondents said they were either satisfied or highly satisfied with their jobs.

Perks that contribute to that loyalty include time off, work-schedule flexibility and the increasingly important factor — job security. These rated No. 1, No. 2 and No. 3 in satisfaction.

Of course, corporate culture also plays a role, survey respondents said in follow-up interviews. The more you like where you're working or what you're working on, the more you overlook the other things.

At The Beck Group, a Dallas-based architecture, construction and development firm, CTO Bryce Morrow knows that he and his staffers are paid 5% to 7% less than peers at similar firms in the Southwest. Beck Group, however, has the advantage of being a smaller, privately owned company that offers workers a lot of flexibility.

"From the CEO down, it's clear people care here," says Morrow, who manages a team of 13 employees. Salaries for this year are expected to remain flat.

For Bill Richards, an infrastructure solutions architect at Hewitt Associates, telecommuting is more important than salary structure. Based in Lincolnshire, Ill., Hewitt is a human resources firm serving clients globally. Richards oversees the company's desktop productivity programs from an office in his home perched on the wooded shore of Lake Superior in upper Michigan.

Richards is living where he wants, he says, and loves what he's doing — negotiating with and managing suppliers, enforcing desktop standards and consulting with lines of business. The 2% to 3% salary increase he's expecting may not cover the increased cost of living, but it's fair for his position, he says, noting that he's nearing the top of his current pay band.

For Alan Watkins, enterprise architecture and IT standards manager for the city of San Diego, job security is more important than pay. The city is in a precarious financial situation — and has been for years — but he figures the nature of his work puts him low on the layoff totem pole.

Watkins manages the city's overall enterprise architecture, with responsibility for IT security, policies and internal controls. He considers the work "interesting and challenging," not to mention invaluable. "I help with internal investigations. I respond to public records requests and subpoenas. . . . I have a lot of corporate knowledge that allows me to find things quickly. Replacing me would be difficult," he says.

Despite the fact that the city has frozen salaries for the past three years and is doing so again for the coming fiscal year, "I'll stick it out," says Watkins, who is three years from retirement. "I'm in a good position career- and salary-wise for what I'm doing."

Given the economic turmoil, IT workers clearly are more grateful for their paychecks now than ever before, respondents say.

"'Lucky' might not be the best word to use, but I would say people do feel fortunate to have their jobs," Beck Group's Morrow says. "Most of the people, at least in my IT group, understood the economic issues long before the economy took the big downturn."

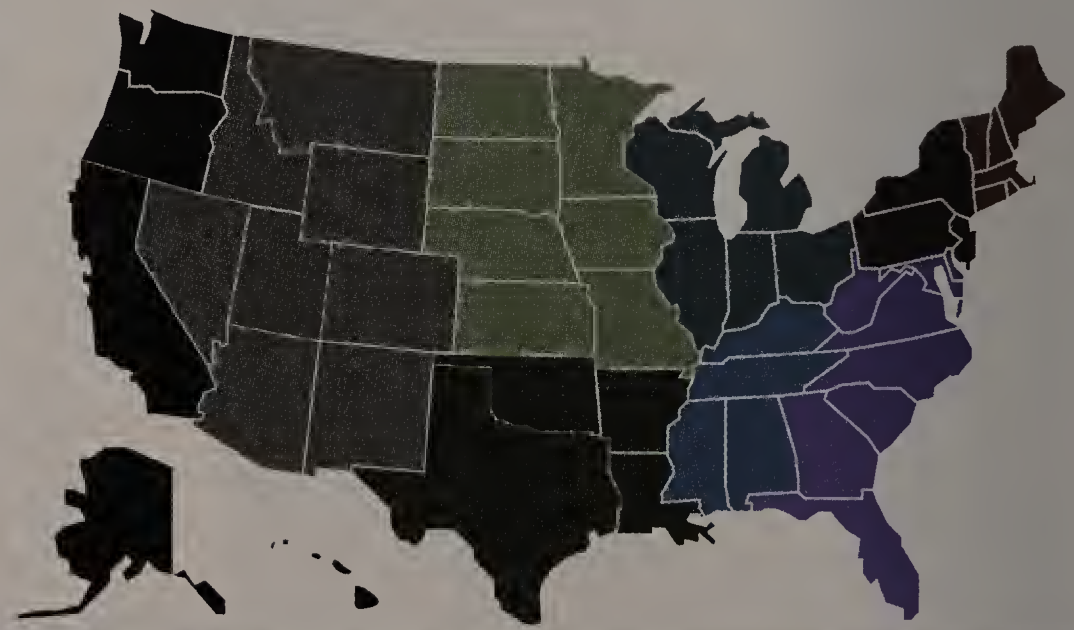
Even so, some IT pros are seeking greener pastures.

Nearly a quarter of respondents classified themselves as

YOUR PAY BY WHERE YOU WORK

	2009 base pay*
New England (Conn., Maine, Mass., N.H., R.I., Vt.)	$97,600
Middle Atlantic (N.Y., Pa., N.J.)	$93,300
Northern Midwest (Ill., Ind., Ohio, Mich., Wis.)	$83,300
Northwest (Iowa, Minn., N.D., S.D., Mo., Kan., Neb.)	$80,600
South Atlantic (Fla., Ga., Md., Del., N.C., S.C., Va., W.Va.)	$90,100
Southern Midwest (Ala., Ky., Miss., Tenn.)	$74,800
Southwest (Ark., Okla., La., Texas)	$86,600
West (Ariz., Colo., Idaho, Mont., N.M., Nev., Utah, Wyo.)	$89,600
Pacific (Alaska, Calif., Hawaii, Ore., Wash.)	$95,600

*ALL DOLLAR FIGURES ARE PROJECTED MEAN AVERAGES
SOURCE: *NETWORK WORLD* SALARY SURVEY; 1,854 RESPONDENTS



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YOUR BONUSES AND EXTRA PAY

Half of respondents earn bonuses. Here's the breakdown:

Type of bonus	% receiving
Individual performance	59%
Year-end	37%
Team performance	33%
Profit sharing	28%
Project completion	11%
Retention/stay-on	7%
Certification completion/training	6%
Project milestone	6%
Hot-skill premium	2%

Three-quarters of the respondents receive pay other than salaries and bonuses.

Type of extra pay	% receiving
401k matching	82%
Stock options	13%
Overtime	12%
Stock	9%
Car allowance	6%

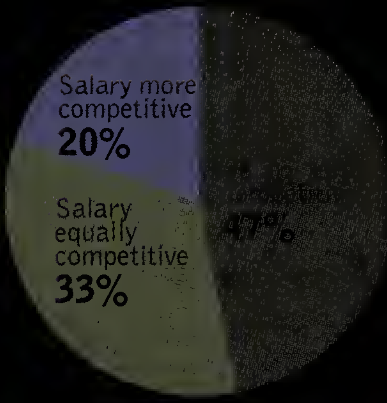
active job seekers, meaning they'll look for new positions this year. Seekers are more likely to be staff members than middle or upper management; and they expect their salaries to increase by 3% or less, stay the same or decrease this year, results show. Speaking to the importance of corporate culture, seekers are twice as likely to be looking for new jobs because of personnel issues or the work environment as those who consider themselves as approachable about new employment opportunities.

Seventeen percent of the respondents are loyalists — IT professionals who said they wouldn't dream of switching jobs this year. Not surprising, loyalists are more satisfied with every job aspect than seekers are. Nearly split between the seeker and the loyalist extremes are those who say they'd explore a new job if they read or heard about an opening and those who would follow through only if personally approached about an opportunity. (See more on loyalty at www.nwdocfinder.com/8137.)

Among those respondents who are planning to change or who would entertain a new opportunity, roughly a third named a boost in salary or career advancement as their top reason for a move. Eight percent of respondents indicated they wouldn't have a choice in the matter. They anticipate looking for work sometime this year because they expect to be laid off. ■

IS THE GRASS GREENER?

Although a majority of survey respondents said they were satisfied with their jobs, almost 50% feel they are paid less at their current companies than they would be elsewhere.



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The changing work environment

What workers are planning for this year

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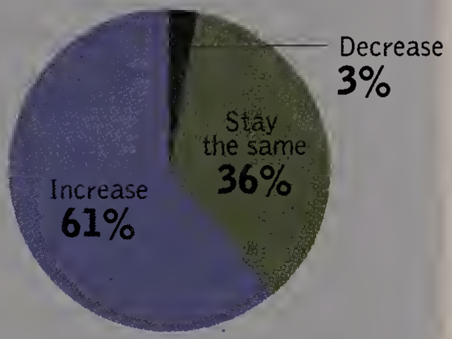
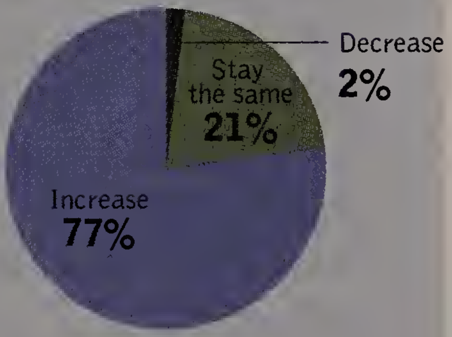
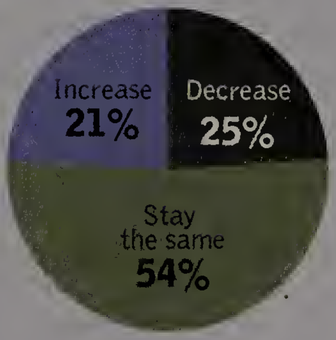


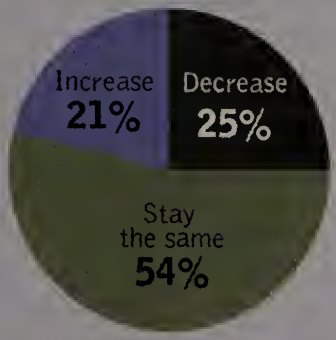
Our workloads and responsibilities will ...



We expect the availability of training to ...



And the company's use of outsourcing will ...



WHO'S HIRING?

Whether due to corporate upheaval or by personal choice, nearly a quarter of our salary survey respondents said they will be actively looking for jobs this year. Another quarter said they'll be hiring IT staff, with four open positions to fill on average. The chances of getting hired are best at companies that:

- HAVE MORE THAN 1,000 EMPLOYEES
- HAVE AT LEAST $500 MILLION IN REVENUE
- COUNT MORE THAN 100 EMPLOYEES IN IT
- ARE IN THE HIGH-TECH OR HEALTHCARE INDUSTRIES
- ARE HEADQUARTERED IN SOUTH ATLANTIC OR SOUTHWESTERN STATES

WHAT TO HIGHLIGHT IN A RESUME

Perhaps suprisingly, survey respondents who have hiring authority don't value certifications as much as more traditional qualifications.

RANK	CRITERIA
1	Previous project and/or technology experience
2	Previous experience within industry sector
3	Education
4	Previous experience at the company
5	Location
6	Certifications

WHAT SKILLS TO BONE UP ON

Hiring managers think virtualization and security positions will be the most difficult openings to fill, while finding qualified Windows administrators will be relatively easy. Hiring managers rated 10 positions on a six-point scale, with 1 being easy to find and 6 being difficult to find.

Difficulty in hiring*	Open positions
4.3	Virtualization specialists
4.3	Security architects, administrators, response team members
4.0	Storage architects, data archiving and backup experts
4.0	Custom software developers and database programmers for non-Web applications
3.9	Data-center managers and architects
3.8	Network designers, architects, operations technicians
3.7	Linux administrators and other open source specialists
3.6	Web applications and database developers/programmers
3.5	Wireless LAN designers, managers
2.6	Windows administrators

* MEAN RANK, BASED ON A SIX-POINT SCALE, WITH 1 BEING EASY AND 6 BEING DIFFICULT TO FIND

SOURCE: *NETWORK WORLD* SALARY SURVEY; 489 RESPONDENTS

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DNS CHANGE MAKERS

HILBERT'S LAW.

In today's world, computers are like telephones; everyone has them and everyone uses them. Cyber criminals are no different. Computers are simply a path to a crime and paths can be followed. The days of online anonymity are gone. With the proper tools, cyber criminals can be tracked and caught.

Cyber crime is on the rise because computer use is universal. Pedophiles, identity thieves, hackers, virus writers, social engineers and even terrorists are using the Internet to further their varying schemes, scams and deeds. The Cyber War is raging and for all of them, their achilles heel is DNS. As a former FBI Cyber Agent and a current Cyber Security Professional, I know that one of the ways to win this war is having the right tools that can quickly track, troubleshoot and accurately analyze DNS activity.

When the battle is on, the one source I turn to that provides me with the comprehensive tools I need is DNSstuff.com. When you deal with issues I deal with on a daily basis, you learn quickly all DNS tools are not equal.

E.J. Hilbert, Former FBI Agent & Director Security Enforcement, MySpace

DNSstuff.com
WHEN GOOD ISN'T GOOD ENOUGH.

Tech tonic for '09

Obama administration can use strong IT policies as elixir for nation's biggest troubles

BY SANDRA GITTLEN

When Barack Obama takes his seat behind the Oval Office's historic Resolute desk, the economic crisis clearly will be his top priority. But as the tech-savvy politician surely knows, he'll only get so far without strong IT-related legislation and action.

"When you look at the economic anxieties we're facing, we definitely are going to need new growth opportunities. We can take the lead on creating 'green' jobs, as well as renewing our commitment to cutting-edge research, and information technology is a critical part of this strategy," says Bruce Mehlman, co-chairman of the Internet Innovation Alliance, a coalition of business and nonprofit organizations.

From the get-go, Obama must set an agenda that encourages and rewards green IT initiatives, signals the maturity and security of cloud computing while easing privacy concerns, and significantly increases investments in R&D to combat cybercrime and discover next-generation Internet tools. Such an agenda should ensure IT's endorsement of his plans.

Green means go

President-elect Obama has vowed to invest $150 billion over the next 10 years to reduce the nation's dependence on foreign oil and promote alternative energy sources. He has earmarked the money in part for clean-energy research and a new venture fund aimed at moving viable projects to commercial markets. According to his campaign technology policy, he hopes this cash influx, as well as industry innovation, will improve energy efficiency 50% by 2030.

The government and IT sector will need to dig deep to achieve this, says Betsy Mullins, vice president for government and political affairs at TechNet, a bipartisan political network of senior executives. "It's generally assumed that energy efficiency gets you 40% of the way to meeting greenhouse goals. To achieve that kind of efficiency, you're going to need IT's input on everything from ensuring that company computers go into a deeper sleep mode, to virtualization, to completely reconfiguring data centers."

Green IT already has proved it makes economic output more eco-friendly by a factor of 10 to 1, according to a 2008 study from the American Council for an Energy Efficient Economy. With data centers being among the largest consumers of energy in the United States, IT executives at major enterprises will have to be brought to the table to identify, test and deploy cutting-edge alternative energy and power-reduction technologies.

Government organizations could provide fertile testing grounds for a number of green IT initiatives, Mullins says. "If the government becomes an early adopter of alternative fuels and energy-saving technology, then it'll drive down the cost for the private sector and signal this is something to be comfortable with."

Two more tech watch points for the Obama administration

- Net neutrality. Make sure the Internet remains a neutral playing ground by creating federal regulations that require carriers to treat all content equally.
- Universal broadband. Before tapping into the Universal Service Fund to extend broadband to everyone, conduct a survey to see what parts of the country still need access. Then determine which approach — wired or wireline — best meets those needs. Also seek out partnerships with the private sector to avoid public cost.

Obama also should focus on longer-term energy tax credits that enable companies to plan for intensive and potentially costly projects, such as solar-powered buildings for their data centers. "If you ensure that the energy tax credits extend out eight years, companies can make these types of IT budget plans confidently," Mullins says.

As president, Obama will have to walk a fine line between creating incentives and over-regulating. He'll also have to make sure that current programs, such as the Department of Energy's and Environmental Protection Agency's Energy Star plan that rewards the use of power-saving technology, work in tandem — not conflict — with newer initiatives. Obama should tap the federal CTO he has called for to take on this cross-agency oversight.

"The administration shouldn't be too prescriptive. Instead, frameworks should be holistic and allow for dynamic innovation, not become a disincentive," says Patty Calkins, vice president of environment, health and safety at Xerox.

Calkins points, for instance, to a technology project at Xerox involving paper reuse that might run counter to traditional energy-reduction thinking. "We're creating a printer where paper can be reused 50 to 60 times. Now, that may mean it consumes a little more energy than traditional laser printers, but it'll save overall on paper manufacturing," she says.

The focus should not be solely on technology, but also on business processes overall, Calkins says. For example, many businesses overprovision individual printing devices for their organizations: "On average, these devices are used only 2% of the time, but are left drawing power 98% of the time. If you replace those with shared, multifunction machines, you can drive down energy consumption and overall manufacturing," she says.

Calkins encourages the Obama administration to do that kind of soul-searching throughout the government, then share its findings publicly to encourage non-government IT teams to do the same.

Into the cloud

As IT budgets continue to tighten in the wake of the economic meltdown, interest has intensified in software-as-a-service and cloud-computing initiatives. Many IT organizations, including those in government, see the positives of these movements, including the immediate elimination of such costs as hardware, software and facilities; and the ability to roll out new applications and storage quickly. The idea of housing data in the cloud, however, raises widespread security and privacy issues.

"The biggest issue around cloud computing is government access to that information. Companies and users want to know what constitutional protections apply to them as information moves into the cloud," says Ari Schwartz, COO for the Center for Democracy and Technology. "There is a concern that there are fewer protections surrounding civil subpoenas and the like for information if it is stored off-site."

Remedying this situation could be as simple as the Obama administration working with Congress to extend the Electronic Communications Privacy Act of 1986 to information stored in the cloud. "This is similar to what we faced with e-mail. We created a new set of laws that addressed government access and civil subpoenas," Schwartz says.

On the other hand, it could be more cumbersome.

"We definitely need to 'cyber-hyphen' a lot of our laws because they haven't been updated to include Internet crimes," says Brian Contos, CSO at security-software maker ArcSight.

Network World columnist Scott Bradner is more explicit. The Obama administration should "require that law enforcement at all levels follows proper constitutional processes when obtaining information about individuals. There should be criminal penalties for individuals who fail to follow proper procedures and for any organization that assists them," he said in a recent column (see www.nwdocfinder.com/8130).

Even cloud-computing companies agree the government has to calm fears about privacy intrusion for the market to hit its full potential.

"There is an onus on government to indicate that it is not going to go on blanket searches without cause or purpose and it won't randomly look at data stored in the cloud. Citizens also should have reasonable expectations of due process when the government does look at data," says Daniel Burton, senior vice president of global public policy at Salesforce.com.

Equally important as legislation, however, are the signals the Obama administration sends to the market. The government, which faces the triple whammy of aging applications, slashed infrastructure budgets and a slimmed-down IT workforce, should lead by example. "The best thing [government agencies] can do is adopt cloud computing themselves and show it's a safe tonic for productivity and cost cutting," Burton says.

R&D spree

Lastly, the Obama administration must loosen the purse strings on high-tech R&D to advance cybersecurity, the next-generation Internet and other mission-critical infrastructure work.

"Funding to secure the networks supporting our critical infrastructure has definitely lacked in recent years, yet it's this critical infrastructure that is becoming a prime target for criminals and terrorists because of the rapid damage a breach can cause. The old technology, running things that essentially keep the country's lights on, was not designed to operate in the age of cybercrime we see today. These are extremely vulnerable, legacy environments," ArcSight's Contos says.

Researchers must find a way to integrate IT systems and processes better with their associated critical infrastructure, Burton says. For example, they've got to find a way to integrate advanced controls and cyber-security devices with the electric grid, as well as better monitor and respond to threats to oil and gas control-system networks.

While some government, academia and industry leaders have gathered to solve these challenges, the efforts have been piecemeal. The incoming administration, whether through the new CTO's office, the Department of Homeland Security or other agency, needs to lead and fund concerted and coordinated efforts, Contos says.

The Obama administration also can help further cybercrime research by gathering corporate IT security teams for roundtables on their biggest challenges. "We see strides when peers in industries such as banking, oil and gas feel safe to meet and discuss security in an open fashion. The government facilitating that kind of discussion makes sense," Contos says.

Contos also advocates government funding of the myriad, advanced security projects happening in universities across the country. "These are the people still doing research for the sake of research, and there is some incredible, cutting-edge global collaboration as a result," he says. Some universities, he adds, already are dedicating significant resources to preventing cyberattacks.

One inhibitor to "research for the sake of research" in the private sector has been the government's waffling on the Research and Experimentation Tax Credit, which Congress has let expire and renewed a dozen times since its inception in 1981. For companies to feel secure green-lighting longer-term projects, the government must make the tax credit permanent — a sentiment Obama shared during his candidacy.

As a final R&D initiative, the new administration must channel significant dollars into all levels of education in science and mathematics. This would ensure a new generation of technologically innovative workers. Many feel the more highly skilled tech labor we generate at home, the less we'll need the controversial H-1B visa program to bring in foreign workers from abroad.

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